INTERNATIONAL MARITIME ORGANIZATION

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REPORT TO THE MARITIME SAFETY COMMITTEE

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LIST OF ANNEXES

1 GENERAL

1.1 The Sub-Committee on Safety of Navigation held its forty-sixth session from 10 to 14 July 2000 at the Headquarters of the Organization, under the chairmanship of Mr. K. Polderman (The Netherlands). The Vice Chairman, Dr. V.I. Peresypkin (Russian Federation), was also present.

1.2 The session was attended by representatives of the following countries:

ALGERIA
ANGOLA
ANTIGUA AND BARBUDA
ARGENTINA
AUSTRALIA
BAHAMAS
BANGLADESH
BELGIUM
BRAZIL
BULGARIA
CANADA
CHILE
CHINA
COLOMBIA
CUBA
CYPRUS
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
ECUADOR
EGYPT
FINLAND
FRANCE
GEORGIA
GERMANY
GREECE
INDONESIA
ITALY
JAPAN
LIBERIA
MALAYSIA
MARSHALL ISLANDS
MEXICO
NETHERLANDS
NORWAY
PANAMA
PERU
PHILIPPINES
POLAND
PORTUGAL
REPUBLIC OF KOREA
ROMANIA
RUSSIAN FEDERATION
SAUDI ARABIA
SINGAPORE
SOUTH AFRICA
SPAIN
SWEDEN
TURKEY
UKRAINE
UNITED KINGDOM
UNITED STATES
VENEZUELA
YEMEN

and of the following Associate Member of IMO:

HONG KONG, CHINA

1.3 The following intergovernmental and non-governmental organizations were also represented:

INTERNATIONAL HYDROGRAPHIC ORGANIZATION (IHO)
LEAGUE OF ARAB STATES
INTERNATIONAL COMMITTEE OF THE RED CROSS (ICRC)
INTERNATIONAL MOBILE SATELLITE ORGANIZATION (IMSO)
INTERNATIONAL CHAMBER OF SHIPPING (ICS)
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
INTERNATIONAL SHIPPING FEDERATION LTD (ISF)

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)
INTERNATIONAL UNION OF MARINE INSURANCE (IUMI)
INTERNATIONAL CONFEDERATION OF FREE TRADE UNIONS (ICFTU)
INTERNATIONAL ASSOCIATION OF MARINE AIDS TO NAVIGATION AND LIGHTHOUSE AUTHORITIES (IALA)
INTERNATIONAL RADIO-MARITIME COMMITTEE (CIRM)
THE BALTIC AND INTERNATIONAL MARITIME COUNCIL (BIMCO)
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES (IACS)
OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)
INTERNATIONAL MARITIME PILOTS ASSOCIATION (IMPA)
INTERNATIONAL ASSOCIATION OF INSTITUTES OF NAVIGATION (IAIN)
INTERNATIONAL FEDERATION OF SHIPMASTERS' ASSOCIATIONS (IFSMA)
INTERNATIONAL ASSOCIATION OF INDEPENDENT TANKERS OWNERS (INTERTANKO)
SOCIETY OF INTERNATIONAL GAS TANKER AND TERMINAL OPERATORS (SIGTTO)
INTERNATIONAL LIFEBOAT FEDERATION (ILF)
INTERNATIONAL COUNCIL OF CRUISE LINES (ICCL)
INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS (INTERCARGO)
INTERNATIONAL SAILING FEDERATION (ISAF)
INTERNATIONAL MARINE CONTRACTORS ASSOCIATION (IMCA)
WORLD NUCLEAR TRANSPORT INSTITUTE (WNTI)
INTERNATIONAL HARBOUR MASTERS' ASSOCIATION (IHMA)

1.4 In welcoming the participants, the Secretary-General first referred to the successful conclusion by NAV 45 of the revision of SOLAS chapter V. The draft revised text had been approved by MSC 72 and circulated in accordance with SOLAS article VIII for consideration and adoption by MSC 73 (Circular letter No. 2224 of 26 May 2000). He was confident that the MSC would adopt the revised chapter so that it might enter into force on 1 July 2002, as originally planned. Once this was accomplished, the efforts the Sub-Committee had painstakingly made over a period of eight years to produce an updated chapter to lead the maritime community safely in the highly technological new century, would have been successfully completed.

Having remarked that one of the new regulations of the revised chapter V dealt with safe navigation and avoidance of dangerous situations, he added that, although the revised chapter was not in force yet and details about the cause of the ferry **Cahaya Bahari** casualty with reported heavy loss of life, in the Indonesian archipelago in June 2000, had not yet been officially released, he had the feeling that, if the requirements of the new regulation had been properly observed, the sinking of the ill-fated ship might have been averted. Any voyage, no matter whether in sheltered areas or under favourable weather conditions, was a potentially perilous venture and any complacency might lead to a disaster.

The Secretary-General then turned to the main tasks of the Sub-Committee, which included proposals for routeing and other measures aimed at enhancing the safety of navigation in areas of identified navigational hazards and environmentally sensitive sea areas. He mentioned particularly the proposals calling for the establishment of new traffic separation schemes along the Peruvian coast; amendments to the existing new traffic separation scheme in Prince William Sound; a mandatory ship reporting system off Les Casquets and the adjacent coastal area; the establishment of three mandatory no anchoring areas at Flower Garden Banks in the

Northwestern Gulf of Mexico; amendments to the General Provisions on Ships' Routeing; and amendments to resolution MSC.43(64) on Guidelines and criteria for ship reporting systems.

He then made a specific reference to the joint proposal by France and the United Kingdom for a mandatory ship reporting system off Les Casquets and the adjacent coastal area stemming from the tanker **Erika** accident off the western coast of France in December 1999. Since then, the Government of France had been considering various measures to reduce the likelihood of similar accidents recurring around its coasts and to strengthen the safety of navigation and the effectiveness of maritime traffic and environmental protection. He expressed appreciation to France and other countries for presenting their proposals to IMO, as he strongly believed that the Organization was the right and only place where issues concerning international shipping safety and environmental protection should be discussed and resolved.

Regarding the proposals to amend the Collision Regulations to address small ships and high-speed craft as well as operational aspects of Wing-in-Ground craft, he stressed that, since it was the prerogative of the Assembly to adopt amendments to the Collision Regulations, it was imperative that the Sub-Committee finalized these amendments at this session and forwarded them to MSC 73 for approval and onward submission to A 22.

The investigation report into the collision between the cruise ship **Norwegian Dream** and the container ship **Ever Decent** in the approaches to the Dover Strait in August 1999 had been received from the Bahamas Maritime Authority concerning the **Norwegian Dream** and the corresponding report concerning the **Ever Decent** was expected soon from the appropriate authorities of Panama. The use by the Bahamian investigating authorities of simulation techniques was quite innovative and he believed that technologically advanced methods could help accident investigators, IMO and the maritime community to get to the root of maritime accidents so that the lessons learnt as a result are, to the extent possible, based on accurate data.

The Secretary-General then identified the consideration of performance standards for navigational equipment, review of the Standard Marine Communication Phrases, development of operational guidelines on the use of AIS and the comprehensive review of the High-Speed Craft Code, as important items on the Sub-Committee's agenda.

He concluded by referring to resolution A.900(21) entitled "Objectives of the Organization in the 2000s", which addressed the areas on which IMO should mainly focus its attention during the current decade. Of all the subjects on which the Assembly had directed the Committees, under the co-ordination of the Council, to focus attention, he specifically mentioned:

- the shifting of emphasis on to people;

- the effective uniform implementation of IMO standards, in particular the revised STCW Convention and the ISM Code;

- the development of a safety culture and environmental conscience; and

- the strengthening of the Organization’s technical co-operation programmes and delivery on a priority basis.

The Secretary-General expressed the hope that the Sub-Committee would respond successfully to the requests of the Assembly and the Council and would contribute substantially to IMO’s concerted efforts for enhanced safety and environmental protection.

1.5 The Chairman thanked the Secretary-General for his words of encouragement and stated that the Secretary-General's advice and requests would be given every consideration in the Sub-Committee's deliberations.

Adoption of the agenda

1.6 The Sub-Committee adopted the agenda, as approved by MSC 72 (NAV 46/1 and NAV 46/2/1, annex 2). The agenda of the session, including a list of documents submitted under each agenda item is given in annex 1.

2 DECISIONS OF OTHER IMO BODIES

2.1 The Sub-Committee noted, in general decisions and comments (NAV 46/2 and NAV 46/2/1), pertaining to its work made by A 21, STW 31, FSI 8, DE 43, MEPC 44 and MSC 72 and considered them under the relevant agenda items.

2.2 The Sub-Committee noted in particular the instruction by MSC 72 (MSC 72/23, paragraph 15.16) to all Sub-Committees to apply the Human Element Analysing Process (HEAP) given in MSC/Circ.878/MEPC/Circ.346 as a matter of priority in their work and the request to provide information on experience gained during application of that process with a view to further improvements, which it would take into account in its work, as appropriate.

3 ROUTEING OF SHIPS, SHIP REPORTING AND RELATED MATTERS

New Traffic Separation Schemes (TSSs)

3.1 The Sub-Committee recalled that at its forty-fourth session, it had examined a proposal by Peru for twenty-one traffic separation schemes, along the coast of Peru for improving navigational safety in areas of convergence and high traffic density. However, NAV 44 was of the opinion that some improvements on the delineation and description of the proposed schemes were necessary. Accordingly, Peru had agreed to review the proposed traffic separation schemes and had indicated that it would submit revised proposals for consideration with a view to adoption at the earliest possible opportunity. A proposal was submitted to NAV 45 for four traffic separation schemes which were approved by NAV 45 and finally adopted by MSC 72.

3.2 At the request of the Government of Peru (NAV 46/3 and Rev.1), the Sub-Committee examined a revised proposal (NAV 46/3/Rev.1) for four new traffic separation schemes along the Peruvian coast, namely:

.1 Landfall and approaches to Talara Bay;

.2 Landfall Off Puerto Salaverry;

.3 Landfall and approaches to Ferrol Bay (Puerto Chimbote); and

.4 Landfall and approaches to San Nicolas Bay.

3.3 The Sub-Committee approved the proposed new traffic separation schemes along the Peruvian coast, given in annex 2.

New TSSs and recommended tracks for the southern Red Sea

3.4 At the request of the Government of Yemen (NAV 46/3/5), the Sub-Committee examined a preliminary proposal for the establishment of new and amended traffic separation schemes in the southern Red Sea, to increase maritime safety and protection of the marine environment. The main aim of this proposal was to seek guidance from the Sub-Committee as to whether the proposed routes are deemed to be correctly located and aligned prior to the execution of hydrographic survey work.

3.5 The Sub-Committee noted that the proposal had also been endorsed, in principle, by the Government of Eritrea, namely through the Ministry of Transport and Communications, Eritrea and the Government of Djibouti.

3.6 The Sub-Committee agreed with the preliminary proposal from Yemen and was of the opinion that the proposal was sound and a good basis for the execution of the hydrographic surveys intended by Yemen. The Sub-Committee commended the delegation of Yemen for its thorough and well documented proposal, and complimented them on their sound management approach.

3.7 The delegation of Yemen stated that although the Republic of Yemen was taking the leading role regarding the proposals to establish routeing measures in the southern part of the Red Sea, and had arranged for the financing necessary for its implementation through the Strategic Action Programme of the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA), it wished to assure the Sub-Committee that it was co-ordinating its efforts with other countries concerned and that the formal proposal to IMO would be submitted by all the Parties concerned.

New TSSs in the approaches to the River Humber

3.8 At the request of the Government of the United Kingdom (NAV 46/3/7), the Sub-Committee examined a proposal for the establishment of new traffic separation schemes and associated routeing measures in the approaches to the River Humber, on the east coast of the United Kingdom to cope with the increase in the volume of maritime traffic.

3.9 The Sub-Committee approved the proposed new traffic separation schemes and associated routeing measures in the approaches to River Humber, given in annex 2.

Amendments to existing Traffic Separation Scheme (TSS) in Prince William Sound

3.10 At the request of the Government of the United States (NAV 46/3/1), the Sub-Committee examined a proposal for amendments to the traffic separation scheme in Prince William Sound. The proposed amendments would reduce the potential for traffic congestion in the area and contribute to improving vessel traffic management and safety.

3.11 The Sub-Committee approved the proposed amendments to the traffic separation scheme in Prince William Sound, given in annex 2.

Mandatory ship reporting system Off Les Casquets and the adjacent coastal area

3.12 The Sub-Committee noted that MSC 72 considered a proposal by France (MSC 72/10/13), submitted in the wake of the tanker **Erika** accident off the French coast in December 1999, on measures to reduce the likelihood of similar accidents occurring around its

coasts and to strengthen safety of navigation, effectiveness of maritime traffic and environmental protection.

3.13 France was of the opinion that:

.1 the safety of navigation would be improved by the introduction of a mandatory ship reporting system in the traffic separation scheme Off Les Casquets and the adjacent coastal area for ships over 300GT, in accordance with the provisions of SOLAS regulation V/8.1; and

.2 the proposed new mandatory reporting system would supplement the already existing mandatory ship reporting systems in place at Ushant (1996) and in Pas de Calais (1999).

3.14 The Sub-Committee further noted that MSC 72 decided to request NAV 46 to consider the French proposal (MSC 72/10/13) together with the more detailed relevant joint submission by France and the United Kingdom to NAV 46 (NAV 46/3/4) in the context of its agenda item 3 - Routeing of ships, ship reporting and related matters.

3.15 At the request of the Governments of France and the United Kingdom (MSC 72/10/13 and NAV 46/3/4), the Sub-Committee examined proposals for the establishment of a mandatory ship reporting system "Off Les Casquets and the adjacent coastal area" for ships over 300 GT, in accordance with the provisions of SOLAS regulation V/8-1. The proposed system would be used by the Jobourg vessel traffic service (VTS), which since 1983 has been monitoring shipping in the traffic separation scheme (TSS) off Les Casquets and the surrounding area. It would supplement the systems already in place at Ouessant and in the Pas de Calais and thus strengthen the general monitoring and prevention arrangements in the Channel. The new system should make possible a significant increase in safety, efficiency of navigation and environmental protection in and around the TSS off Les Casquets. In fact, mandatory reporting should avoid the hazardous situations which can be caused by unidentified ships which adopt erratic or even dangerous routes, stop in a traffic lane after sustaining damage, or behave in a manner which could give rise to confusion in the absence of information.

3.16 The objectives and demonstrated needs for the proposed mandatory ship reporting system as submitted by France and the United Kingdom is attached at annex 3 for information.

3.17 The Sub-Committee amended the proposed mandatory reporting system to conform with the format adopted by the Committee at its sixty-sixth session and prepared the draft MSC resolution on a mandatory ship reporting system "Off Les Casquets and the adjacent coastal area", given in annex 3, which the Committee is invited to adopt, in accordance with resolution A.858(20). The system will enter into force at 0000 hours UTC, six months after its adoption by the Committee.

Amendments to the General Provisions on Ships' Routeing

No anchoring routeing measure

3.18 The Sub-Committee considered the proposal by the United States (NAV 46/3/2) for an amendment to section 2 "Definitions", section 4 "Methods", section 5 "Planning" and section 9 "Representation on charts" of the General Provisions on Ships' Routeing (resolution A.572(14), as amended)) to provide for adoption of a no anchoring area routeing measure. According to the United States proposal, no anchoring areas could be adopted in areas where anchoring is unsafe,

unstable, hazardous, or it is particularly important to avoid damage to the marine environment, and therefore anchoring should be avoided by all ships or certain classes of ships.

3.19 The Sub-Committee supported in general the proposal of the United States and agreed that anchoring was a normal part of following a route during a voyage. It was of the opinion that the establishment of a no anchoring area could be regarded as a routeing measure, the establishment of which should be governed by the General Provisions on Ships' Routeing.

3.20 The Sub-Committee however was of the opinion that the proposed definition for "no anchoring area" should be restricted to ensure avoiding proliferation of no anchoring areas in the seas of the world.

3.21 The Sub-Committee agreed with the United States proposal, as amended, and invited the Committee to adopt, subject to confirmation by the Assembly, the proposed amendments given in annex 4, in accordance with resolution A.572(14), as amended.

Criteria for bunker fuel in ships' routeing provisions

3.22 The Sub-Committee recalled that at NAV 45 it did not support the proposal by the United Kingdom (MSC 71/20/3) to establish criteria for ships' bunker fuels to be used in provisions for ships' routeing. Instead it was of the opinion that there would be merit to incorporate a general provision for ships' bunker fuels in an appropriate paragraph of the General Provisions of Ships' Routeing, for instance, in section 3.11.4 addressing the application to ships using a routeing system or any part thereof.

3.23 The Sub-Committee considered the new proposal by the United Kingdom (NAV 46/3/6) for amendments to the General Provisions on Ships' Routeing (resolution A.572(14), as amended)) for taking account of the pollution threat of ships' bunker fuel in ships' routeing.

3.24 The Sub-Committee agreed with the United Kingdom proposal, as amended, and invited the Committee to adopt, subject to confirmation by the Assembly, the proposed amendments given in annex 4, in accordance with resolution A.572(14), as amended.

Amendments to resolution MSC.43(64) on Guidelines and Criteria for Ship Reporting Systems

3.25 The Sub-Committee considered and agreed to the proposal by the United Kingdom (NAV 46/3/6) to amend section 3 "Criteria for planning, proposing and implementing adopted ship reporting systems by contracting Governments" of the resolution MSC.43(64) on Guidelines and Criteria for Ship Reporting Systems, and prepared the draft MSC resolution on amendments to the Guidelines and Criteria for Ship Reporting Systems, given in annex 5, for consideration and adoption by the Committee.

Routeing measures other than TSSs

Mandatory no anchoring areas for Flower Garden Banks in the north-western Gulf of Mexico

3.26 The Sub-Committee, noting that it had agreed to amend the General Provisions on Ships' Routeing (paragraphs 3.1 to 3.4) to enable the establishment of no anchoring areas as a new routeing measure, examined a proposal from the United States (NAV 46/3/3) for the establishment of three mandatory no anchoring areas on coral reef banks (Flower Garden Banks)

in the north-western Gulf of Mexico by ships greater than 30.48 metres (100 feet in length). The proposed measure was expected to significantly prevent and reduce the risk of damage to the coral marine environment by ships, without restricting the sea area available for navigation. The sizes of the areas and the proposed measures are limited to what was essential for the interests of safe navigation and the protection of the marine environment.

3.27 The Sub-Committee agreed with the proposed establishment of mandatory no anchoring areas on Flower Garden Banks coral reefs in the north-western Gulf of Mexico. It was of the opinion that, in this particular case, the mandatory no anchoring areas should apply to all ships. The description of the three agreed mandatory no anchoring areas, which is to be inserted in Part G of the IMO publication on Ships' Routeing – Mandatory ship reporting systems and mandatory routeing systems, is attached in annex 6, which the Committee was invited to adopt.

Implementation of the new and amended traffic separation schemes including routeing measures other than TSSs

3.28 The new and amended traffic separation schemes including routeing measures other than TSSs given in annexes 2 and 6, which the Committee is invited to adopt, in accordance with resolution A.858(20), will be implemented at 0000 hours UTC six months after their adoption by the Committee.

Amendments to the Provision of Aids to Navigation in the Dover Strait Traffic Separation Scheme

3.29 The Sub-Committee noted the information provided by the United Kingdom (NAV 46/INF.3) advising the planned amendments to the F3 Light Vessel Station and MPC Lighted Buoy in the Dover Strait traffic separation scheme.

Amendments to Admiralty Charts 2720, 2721 and 2722 in the vicinity of St.Kilda and the Flannan Isles

3.30 The Sub-Committee noted the information provided by the United Kingdom (NAV 46/INF.7) advising on the action being taken by the United Kingdom Hydrographic Office (UKHO) to clarify the status of hydrographic survey information in the vicinity of St.Kilda and the Flannan Isles.

New presentation of charts

3.31 The Members of the Sub-Committee enjoyed for the first time the use of a new form of presentation of charts through electronic means which was found to be clear and effective with the projected enlarged charts on the screen and welcomed the initiative made by the Secretariat.

4 AMENDMENTS TO THE COLREGs

4.1 The Sub-Committee recalled that, at its forty-fourth session, it had given preliminary consideration to the proposals on amendments to the COLREGs including high-speed craft and had agreed to further consider them at NAV 45, inviting Members to submit their comments and proposals on these issues to NAV 45.

4.2 The Sub-Committee also recalled that, at its forty-fifth session, due to lack of time, it was unable to discuss all proposals and only considered proposals by Japan (NAV 45/4/3) and ISAF (NAV 45/4) relating to amendments to the COLREGs concerning provisions for whistles and

sound signals. The Ships' Routeing Working Group approved preliminary draft amendments to Rules 33, 35 and annex III of the COLREGs for inclusion in the set of amendments to the COLREGs to be considered by the Sub-Committee at its forty-sixth session.

4.3 The Sub-Committee further recalled that at its forty-fifth session, it instructed the Ships' Routeing Working Group to consider other amendments to the COLREGs as proposed in the relevant documents submitted on this issue and report to NAV 46.

Provisions for whistles and sound signals

4.4 The Sub-Committee gave final consideration to annex 1 of NAV 46/4 and agreed with the draft amendments to Rule 33 "Equipment for sound signals", Rule 35 "Sound signals in restricted visibility" and Annex III Technical Details of Sound Signal Appliances, section 1 - Whistles. After further consideration of Annex III, section 2 Bell or gong, paragraph (b) - Construction, the Sub-Committee agreed to delete the last part of the second sentence and approved the amended text accordingly. The agreed draft amendments appear at annex 7.

High-speed craft

4.5 The Sub-Committee recalled that at its forty-fifth session, it considered amendments to the COLREGs with respect to proposed amendments for high-speed craft on the basis of the proposals submitted by Hong Kong China (NAV 45/4/1) and ISAF (NAV 45/4/4) together with earlier submitted documents on provisions for high-speed craft.

4.6 The Sub-Committee considered the report of the Ships' Routeing Working Group (NAV 46/4, paragraphs 5.1 to 5.6) and noted that the Group was divided on this issue.

4.7 The Sub-Committee noted that some delegations, including Canada, Denmark, Germany, Norway, Sweden, Hong Kong, China, IMPA and IFSMA, had pointed out that the basic concept of the COLREGs indicated a vessel's ability or otherwise to manoeuvre as required by the COLREGs. To introduce a special light for a high-speed craft thus would be a fundamental change of the basic concept of the Rules which could lead to confusion and ambiguity. Displaying such a light would have no meaning unless it was associated with an amendment to the Steering and Sailing Rules. An amendment to the Steering and Sailing Rules was in the opinion of these delegations not required because a high-speed craft was not restricted in its ability to manoeuvre. Such an amendment would place an unfair burden and responsibility on the high-speed craft which would be unreasonable and in certain cases unsafe. The protection of small craft in relation to high-speed craft could be enhanced by provisions for example radar reflectors or target enhancers.

Other delegations were of the opinion that some amendments are needed to incorporate provisions for high-speed craft in the COLREGs, for the following reasons:

.1 there had been a considerable increase in the number of high-speed craft coming into operation throughout the world, especially in areas of high traffic density, and there had also been an increase in the speed and size of such craft. Many of these high-speed craft carried a large number of passengers, which emphasised the need to consider measures to improve their safety. IMO should follow a pro-active approach rather than reacting to a particular serious accident;

.2 there was a good case for considering an amendment to the Rules relating to the responsibility of such vessels, Rule 17/18. Whether or not such an amendment

was made, consideration should be given to a special signal to be displayed by a high-speed craft to give early warning of the rapidity of their approach;

.3 if this opportunity was not taken to amend the COLREGs with respect to high-speed craft it might not be possible to re-introduce the topic for many years to come; and

.4 it was the general practice of high-speed craft to take early action to avoid collision regardless of whether they were required to stand-on or give way. Such action was sometimes taken at a stage when the risk of collision had developed and might not therefore be in accordance with the existing COLREGs. The existing COLREGs were formulated before high-speed craft came into frequent use.

4.8 As the Ships' Routeing Working Group was unable to arrive at conclusions on any provisions for high-speed craft in COLREGs at NAV 45, it reconsidered the matter at this session.

4.9 The Sub-Committee considered the proposals submitted by Hong Kong, China (NAV 46/4/1) and Australia (NAV 46/4/2).

4.10 On the basis of the submission by Australia (NAV 46/4/2), the Sub-Committee prepared and agreed a draft amendment to Annex I, section 13 – High-speed craft, to the COLREGs. The draft amendment is given at annex 7.

4.11 The Sub-Committee remained divided on the need for amendments on other provisions for high-speed craft in the COLREGs, such as for the Steering and Sailing Rules and for the carriage of an additional light. No proposals for amendments on these issues were submitted. The Sub-Committee therefore did not agree on any further amendment to the COLREGs relating to high-speed craft.

4.12 The delegation of the Netherlands stated that although the Working Group on Ships' Routeing has reached agreement on various issues (e.g. Rule 8, WIG craft and sound signals for small vessels) concerning future amendments to the COLREGs, it could not agree on the need to amend the Collision Regulations to accommodate the specific manoeuvring characteristics of High Speed Craft, which was raised at NAV 43 by the Netherlands (NAV 43/3/4) and IAIN (NAV 43/3/12) and put on the work programme of the Sub-Committee by the Committee.

In busy and confined waters, these Rules are frequently not being observed properly by HSC craft and other vessels. Stand-on HSC craft give way and give-way conventional vessels keep their course and speed. Early evasive action was not always possible and in multi-ship encounters very complicated and confusing situations develop with little response time, which could lead to very dangerous situations and many lives could be at risk.

The delegation of the Netherlands further stated that it was aware and understood the concerns of those opposing amendments to the Collision Regulations. So far very few accidents had occurred, so there seemed to be little need to do something. At the same time the opponents stated this would require fundamental retraining of many mariners, pilots and VTS-operators etc. However, with the increasing use of HSC craft, in particular as passenger ferries, accidents were more likely to happen. When an accident did happen with the present discrepancy between the Collision Regulations and the day-to-day practice in busy and confined waters there would be a

public outcry for tough measures, unclear legal positions for the mariners involved and protracted procedures to determine the liabilities for the ship owners involved.

The Netherlands therefore would have preferred the Organization and its Members to have taken a pro-active approach to resolve these issues before serious accidents occur.

Wing-In-Ground (WIG) craft

4.13 The Sub-Committee recalled that, at its forty-fourth session, it had considered the proposal by the Russian Federation (NAV 44/9) on possible amendments to COLREGs relating to operational aspects of wing-in-ground (WIG) craft and prepared a preliminary draft for amendments to the COLREGs, (NAV 44/14, annex 19). NAV 44 was also of the opinion that this matter should be further considered in connection with proposed amendments to the COLREGs for high-speed craft.

4.14 The Sub-Committee considered the report of the Ships' Routeing Working Group (NAV 46/4, paragraphs 6.1 to 6.3) and noted that, the Group, considering a proposal by the Russian Federation (NAV 45/4/2) on provisions for WIG craft, had agreed to include additional paragraphs in the preliminary draft amendments to the COLREGs (NAV 46/4, annex 2).

4.15 There was considerable discussion in the Plenary on whether there was a need for developing amendments to the COLREGs to include WIG craft. Some delegations were of the opinion that since there was neither an agreed definition of a WIG craft nor that the WIG craft Code had been developed as yet, there was no merit in developing amendments. Other delegations were of the opinion that there was need for some guidance on this matter and that the Sub-Committee should be seen to take action in this matter. Accordingly, the Sub-Committee decided to develop basic amendments to the COLREGs for WIG craft.

4.16 In reconsidering the preliminary draft amendments to the COLREGs with respect to WIG craft, annex 2 of NAV 46/4, the Sub-Committee concentrated on the development of basic amendments for the inclusion of WIG craft in the COLREGs.

4.17 On the issue of a suitable definition on WIG craft for the purpose of the COLREGs, the Sub-Committee was of the opinion that the definition of a seaplane was not suitable to incorporate WIG craft, as a WIG craft cannot be regarded as an aircraft. Therefore the Sub-Committee prepared a separate definition of WIG craft for the purpose of the COLREGs.

4.18 For the Steering and Sailing Rules, the Sub-Committee was of the opinion that it would be appropriate to develop a new paragraph (f) to Rule 18 requiring that WIG craft when taking-off, landing and in flight near the surface shall keep well clear of all other vessels. The Sub-Committee also agreed that WIG craft operating on the water shall comply with the Steering and Sailing Rules as a power-driven vessel.

4.19 On the issue of lights to be exhibited by WIG craft, the Sub-Committee was of the opinion that the use of a yellow flashing light as prescribed in Rule 23(b) for an air-cushion vessel would be inappropriate for the following reasons:

.1 the sole purpose of the yellow flashing light prescribed in Rule 23(b) is to indicate that the aspect of the navigation lights of an air cushion vessel, when operating in the non-displacement mode, is not necessarily an indication of the direction of movement, however this light is not in any way indicating a special obligation for air-cushion vessels as regards the Steering and Sailing Rules;

.2 the air-cushion vessel remains obliged to comply with the Steering and Sailing Rules as a power-driven vessel; and

.3 in the case of a WIG craft during taking-off, landing and in flight near the surface, a WIG craft is obliged to keep well clear of all other vessels, thus in these modes of operation any indication as to the aspect of navigation lights is of no importance to other vessels.

4.20 The Sub-Committee was of the opinion that it was important to indicate by exhibiting a high intensity all round red flashing light that a WIG craft was taking-off, landing or in flight near the surface.

4.21 On the basis of the above considerations the Sub-Committee agreed the draft amendments, set out in annex 7, which the Committee is invited to approve.

Conflicting actions in collision avoidance

4.22 The Sub-Committee recalled that MSC 70 had authorized it to consider the issue of conflicting actions in collision avoidance, in the context of its consideration of amendments to COLREGs, in accordance with the proposed terms of reference (NAV 44/14, annex 12).

4.23 The Sub-Committee also recalled that it had been tasked with discussing the relative high frequency of conflicting actions resulting in collisions, especially in meeting and fine crossing situations and proposing solutions which may include amending the COLREGs and submission of any recommendation to the Committee.

4.24 The Sub-Committee considered the report of the Ships' Routeing Working Group (NAV 46/4, paragraphs 7.1 to 7.8) and noted that, the Group was of the opinion that the relatively high frequency of conflicting actions in collision avoidance was a matter which should be addressed in the proper training of navigating officers. Reports of collision cases, however, indicated that at times in head-on or near head-on encounters Rule 8 was applied in isolation of the other Steering and Sailing Rules, resulting in conflicting actions and collisions. The Group therefore had agreed with the amendment to Rule 8(a) proposed by the Netherlands (NAV 43/3/4) to link Rule 8 with the other Steering and Sailing Rules (NAV 46/4, annex 3 refers); however, the Group did not support the proposal of the Netherlands to add a new paragraph to Rule 8 to increase awareness of the danger of conflicting actions.

4.25 The Sub-Committee noted that the Ships' Routeing Working Group had agreed to include the afore-mentioned proposed amendment in the preliminary draft amendment to the COLREGs with respect to Rule 8(a) (NAV 46/4, annex 3).

4.26 The Sub-Committee accordingly agreed with the draft amendment to Rule 8(a) of the COLREGs as given in annex 7 for consideration and approval by the Committee.

4.27 The Sub-Committee was of the opinion that the STW Sub-Committee should be requested to make training establishments for officers of the navigational watch aware of the importance to pay proper attention in the training of officers of the navigational watch to the matter of conflicting actions in collision avoidance.

4.28 The Sub-Committee instructed the Secretariat to bring this matter to the attention of the STW Sub-Committee.

Adoption and implementation of the amendments to the COLREGs

4.29 Noting that in accordance with Article VI(2) of the Convention, amendments to the 1972 Collision Regulations would have to be adopted by the 2001 Assembly, the Sub-Committee prepared the draft Assembly resolution and consolidated amendments given at annex 7 for adoption by the Committee at its seventy-third session in November/December 2000 so that these can be communicated to all Contracting Parties and Members of the Organization at least six months prior to its consideration by the Assembly of the Organization. The entry into force of these amendments will be dependent on a date to be determined by the Assembly at the time of their adoption. The Sub-Committee recommended that the amendments enter into force in November 2003.

5 INTEGRATED BRIDGE SYSTEMS (IBS) OPERATIONAL MATTERS

5.1 The Sub-Committee recalled that, at its forty-fourth session (NAV 44/14, paragraph 7.26), it had noted the information provided by Finland (NAV 44/INF.3) on the operational and design standards for integrated navigation systems (INS) which highlighted the close relationship between integrated navigation systems (INS) and integrated bridge systems (IBS), and laid strong emphasis on the need to examine this aspect thoroughly when considering development of new performance standards for INS.

5.2 The Sub-Committee further recalled that at its forty-fourth session, it had invited Finland to use the information given in NAV 44/INF.3 with the aim of producing a MSC circular at a future session of the Sub-Committee and invited the Committee to include IBS operational aspects in the Sub-Committee's work programme, which was subsequently agreed at MSC 70.

5.3 The delegation of the Netherlands, recognizing the anticipated introduction of AIS as an additional source of navigational information, saw an urgent need for integration of information from different navigational equipment, such as radar, ECDIS and now AIS, within the integrated bridge systems.

5.4 The delegation of the United States stated that in view of the amendments to SOLAS chapter V, which will mandate AIS and will facilitate the broader use of integrated navigation systems, the Sub-Committee should invite STW to consider, as appropriate, on the basis of the performance standards and operational guidance for these systems (i.e. IBS, INS, AIS and ECDIS), the need for new comprehensive guidance on training in the use of new navigation technology which is installed to meet the requirements of the revised SOLAS chapter V. It was also of the opinion that although IEC was looking into the information display issues associated with AIS as part of the larger issue of integrated navigation system displays (i.e. ECDIS, AIS, ARPA, non-ARPA radar, etc.) the IEC effort should not be concluded without input from or a review from the ship operational perspective provided by the Organization.

5.5 The Sub-Committee, concurred with the views expressed by the Netherlands and the United States and noting that no proposals had been received under this agenda item, invited Members, and including all relevant international organizations, in particular IEC, to submit comments/proposals to NAV 47 to make progress on the matter, bearing in mind the target completion date of 2001.

5.6 The Sub-Committee also agreed, subject to approval by the Committee, to invite STW to consider, as appropriate, on the basis of the performance standards and operational guidance for

these systems (i.e. IBS, INS, AIS and ECDIS), the need for new comprehensive guidance on training in the use of the aforementioned new navigation technology.

6 GUIDELINES ON ERGONOMIC CRITERIA FOR BRIDGE EQUIPMENT AND LAYOUT

6.1 The Sub-Committee recalled, that at its forty-fifth session, it had given initial consideration to the report of the Intersessional Correspondence Group co-ordinated by Germany (NAV 45/6) including a draft performance standard on Ergonomic Criteria for Bridge Equipment and Layout and was of the opinion such criteria should be developed in the form of Guidelines. It took into account the document of IEC (NAV 45/6/1) informing that the Technical Committee 80 had noted the work of the aforementioned IMO Correspondence Group and that the fourth edition of IEC 60945 - Maritime navigation and radiocommunication equipment and systems - General requirements, methods of testing and required test results would incorporate, in particular, the criteria being developed.

6.2 The Sub-Committee further recalled, that due to lack of time at that session, it could not complete the work and invited the Committee to extend the target completion date for the agenda item “Guidelines on Ergonomic criteria for bridge equipment and layout” to the year 2000 and include this item in the provisional agenda for NAV 46, which was subsequently agreed to by MSC 72. Members were invited to consider NAV 45/6 and submit their comments and proposals to NAV 46 for consideration and decision, as appropriate.

6.3 The Sub-Committee noted NAV 46/6 (IEC) and NAV 46/INF.6 (ISO). NAV 46/6 reported on work carried out to revise IEC 60945 (Maritime navigation and radiocommunication equipment and systems – General requirements – Methods of testing and required test result) to incorporate a section on design and operation including Ergonomic and Human Machine Interface. NAV 46/INF.6 reported on standards work in ISO/TC 8/SC5 carried out as supplement to ISO 8468 (Ship’s bridge layout and associated equipment – Requirements and guidelines). The new standard is ISO 14612 (Ship’s bridge layout and associated equipment – Additional requirements and guidelines for centralized functions).

6.4 Using the above information, the Sub-Committee completed the table of the existing international standards dealing with ergonomic criteria for bridge equipment and layout, given in annex 4 to NAV 46/7 (Technical Working Group).

6.5 The delegation of the United States called the Sub-Committee attention to an important detail regarding NAV 46/INF.6 and the ISO draft standard for "centralized bridge functions and periodic one-person operation".

6.6 The United States delegation informed the Sub-Committee that having reviewed the draft very carefully it had suggested to ISO that the reference to one-person be removed everywhere it occurs without altering in any way the meaning of the text and without taking away from the value of the concepts being described. The United States view was that guidance on modern bridge layout and equipment should have the primary objective of promoting efficient and effective bridge teamwork and bridge resource management. However, the references to solo-watchkeeping in the ISO draft standard are so frequent and pervasive that the reader is inevitably led to the conclusion that promotion of one-person operation is precisely the underlying purpose of the document. Accordingly, the United States delegation, supported by other delegations, urged the Sub-Committee to invite ISO to remove the references to one-person operation from its draft guidelines on bridge layout.

6.7 The Sub-Committee then considered NAV 45/6 (Germany) which reported on the work of the correspondence group on ergonomic criteria for bridge equipment and layout and, taking into account the table in paragraph 6.4, prepared a draft MSC circular on Guidelines on Ergonomic Criteria for Bridge Equipment and Layout, given in annex 8, and invited the Committee to approve it.

6.8 The Sub-Committee invited the Committee to delete the agenda item "Guidelines on Ergonomic Criteria for Bridge Equipment and Layout" from the Sub-Committee's work programme, as the work had been completed.

7 NAVIGATIONAL AIDS AND RELATED MATTERS

World-Wide Radionavigation System

Assembly resolution A.860(20) on Maritime Policy for a future Global Navigation Satellite System (GNSS)

7.1 The Sub-Committee noted that the twentieth session of the IMO Assembly adopted resolution A.860 (20) on Maritime Policy for a future Global Navigation Satellite System (GNSS).

7.2 The Sub-Committee also noted that MSC 69 (MSC 69/22, paragraph 20.43) had instructed the Sub-Committee to keep the Maritime policy for a future Global Navigation Satellite System (GNSS) under review and prepare a draft report to the twenty-second session of the Assembly, as necessary, for consideration by MSC 74, which required two actions, namely:

.1 the first action, to be completed by Autumn 1999 for input to the twenty-first session of the IMO Assembly, involved a reassessment of the resolution, if necessary, as a result of unforeseen developments on specific proposed future GNSSs; and

.2 the second action, to be completed by Autumn 2001 for input to the twenty-second session of the IMO Assembly, involved the consideration of the proposed future GNSS, including the related agreements between interested Governments, other international organizations and/or system providers.

7.3 The Sub-Committee recalled that, at its forty-fourth session, the Technical Working Group was of the opinion (NAV 45/7, paragraph 2.12) that there had been no unforeseen developments and that there was nothing to add at that stage.

7.4 The Sub-Committee further recalled that at its forty-fifth session, it had considered document NAV 45/7/4 outlining discussions on a future GNSS within the European GNSS Maritime Advisory Forum – specifically identifying potential maritime applications and associated user requirements relevant to a future GNSS. The "List of minimum maritime user requirements for a GNSS" (Appendix 2 to the Annex of resolution A.860(20)) had been reviewed and extended, in particular for non-general maritime navigation applications. The Organization had been invited to make an assessment of the contribution to navigation performance of vessel technical error, charts and a future GNSS. It was recommended that urgent consideration be given to producing charts, cost-effectively, to an accuracy consistent with a GNSS and to a common datum.

7.5 NAV 45 was of the opinion that developments reflected in the report attached to NAV 45/7/4 could be used, to some extent, for review of resolution A.860(20) and invited Members to consider the report and submit their comments and proposals to NAV 46 for consideration with a view to revising resolution A.860(20).

7.6 The Sub-Committee considered NAV 46/7/3 (France, Finland, the Netherlands, Sweden and the United Kingdom) outlining recent discussions on a future GNSS, containing a draft revision of resolution A.860(20) incorporating relevant parts of document NAV 45/7/4. The draft revision up-dates the user requirements for general navigation and positioning and introduces user requirements for non-general navigation and positioning.

7.7 The Sub-Committee prepared the revised text of resolution A.860(20), given in annex 9, and invited the Committee to approve it with a view for submission to the twenty-second session of the Assembly for adoption.

Availability of the Differential Global Positioning System Standard Positioning Service (DGPS-SPS) by the United States Coast Guard as a candidate component of the Global Navigation Satellite System (GNSS)

7.8 The Sub-Committee considered NAV 46/7/1 (United States) regarding the availability of the Differential Global Positioning System Standard Positioning Service (DGPS-SPS) as a candidate component of the Global Navigation Satellite System (GNSS) with a view to recognizing the system as a component of the Global Navigation Satellite System (GNSS), in accordance with the provisions of Assembly resolution A.815(19) on the World-Wide Radionavigation System.

7.9 The Sub-Committee noted that as per resolution A.815(19), in deciding whether or not to recognize a radionavigation system, the Organization should consider whether:

.1 the Government or organization providing and operating the system has stated formally that the system is operational and available for use by merchant shipping;

.2 its continued provision is assured;

.3 it is capable of providing position information within the coverage area declared by the Government or organization operating and providing the system with an accuracy not less than that given in the appendix, taking into account the maximum time interval between updates;

.4 adequate arrangements have been made for publication of the characteristics and parameters of the system and of its status, including amendments as necessary; and

.5 adequate arrangements have been made to protect the safety of navigation should it be necessary to introduce changes in the characteristics or parameters of the system which could adversely affect the performance of shipborne receiving equipment.

7.10 However, the Sub-Committee recalled that the system availability for DGPS service of 99.8% required by resolution A.815(19) was proving difficult to achieve in practice and that IALA were studying the matter. It was therefore concluded that it was premature at present to

recognize the DGPS maritime service offered by the United States and resolution A.815(19) should be revised.

7.11 Therefore, taking into account the above conclusion, the Sub-Committee invited the Committee to include a new agenda item "Review of resolution A.815(19) on World-wide radionavigation system" in the Sub-Committee's work programme and in the agenda for its next meeting so that the issue of availability could be addressed. The United States offered to resubmit the offer on the maritime DGPS service for recognition to a later session in the format required by resolution A.815(19).

Development of performance standards for bridge watch alarms

7.12 The Sub-Committee recalled that MSC 71, after consideration of document MSC 71/20/4 (United Kingdom) and the relevant part of document MSC 71/20/12 (Spain), which was a resubmission of document MSC 70/20/12, decided to include, in the Sub-Committee's work programme, a high priority item on "Performance standards for bridge watch alarms", with 2 sessions needed for completion. The Committee, in making this decision, agreed that there was no intention to re-open the issue of the Officer of the navigational watch acting as the sole look-out in periods of darkness and also that the work to be carried out would be without prejudice to its future work on fatigue.

7.13 The Sub-Committee further recalled that, at its forty-fifth session, it considered the United Kingdom proposal (NAV 45/11) suggesting that the Sub-Committee starts work on "Performance standards for bridge watch alarms" at NAV 46 with a view to completion at NAV 47, and its detailed justification for the urgent consideration of this matter was set out in MSC 71/20/4. The Sub-Committee, noting the decision of MSC 71, and the subsequent concurrence by MSC 72, had decided to add "Performance standards for bridge watch alarms" to its agenda for NAV 46.

7.14 The Sub-Committee instructed the Technical Working Group to consider NAV 46/7/4 (United Kingdom) and NAV 46/7/5 (Germany) and submit its report on the issue to NAV 47 for further consideration.

Revision of performance standards for shipborne satellite radionavigational receivers

7.15 The Sub-Committee recalled that, at its forty-fourth session, it had noted the information provided by IEC (NAV 44/INF.9) on the need for amendment to various IMO resolutions concerning the Global Navigation Satellite System (GNSS) to keep them updated in view of a series of events that have taken place since their adoption. Such events include, amongst others, reports of interference to shipborne GPS receivers from Inmarsat and other sources, the adoption by IMO of resolutions on standards for high-speed craft; and the experience from collisions/groundings etc., in which the use and performance of a GPS shipborne receiver had raised concern with regard to the receiver characteristics.

7.16 The Sub-Committee also recalled that, at NAV 44, it had invited the Committee to include this item in its work programme, which was subsequently done at MSC 71.

7.17 The Sub-Committee, having considered the report of the Technical Working Group at NAV 45 (NAV 46/7, paragraphs 2.1 to 2.2, annexes 1, 2 and 3), agreed the draft revisions of resolution A.819(19) (Performance standards for shipborne global positioning system (GPS) receiver equipment), resolution MSC.53(66) (Performance standards for shipborne GLONASS receiver equipment), resolution MSC.64(67), annex 2 (Performance standards for shipborne

DGPS and DGLONASS maritime radio beacon receiver equipment) and resolution MSC.74(69), annex 1 (Performance Standards for shipborne combined GPS/GLONASS receiver equipment), given in annexes 10, 11, 12 and 13 respectively, for adoption by the Committee.

7.18 The Committee was recommended to delete the agenda item "Revision of Performance Standards for shipborne satellite radionavigational receivers" from the Sub-Committee's work programme, as the work had been completed.

7.19 The Sub-Committee considered document NAV 46/7/6 (Sweden) concerning a proposal to include Receiver Autonomous Integrity Monitoring (RAIM) in the performance standards for shipborne GNSS receivers. RAIM is capable of providing an alarm, if an erroneous signal is received and used for the position solution.

7.20 The Sub-Committee noted that RAIM will not be always available with current satellite navigation systems as the technique relies on there being more than 4 satellites in view. In the future there is likely to be extra satellites in service which will improve the availability of RAIM and also, for the future, other similar techniques were being developed such as Craft Autonomous Integrity Monitoring (CAIM). The Sub-Committee therefore concluded that it was premature to include RAIM in the performance standards at the present time.

User requirements for heading systems

7.21 The Sub-Committee recalled that, at its forty-fourth session, it had considered the CIRM proposal (MSC 69/5/4), referred to it by MSC 69, and was of the opinion that a single performance standard could be prepared including all types of Transmitting Magnetic Heading Devices and agreed the draft performance standards for adoption by the Committee. However, the Sub-Committee was of the opinion that further study was required on the user requirements for heading systems and invited the Committee to include in its work programme a new item dealing with the matter with one session needed. MSC 70, in response to the proposal by NAV 44, decided to include this item in the Sub-Committee's work programme with 1 session needed to complete the item.

7.22 The Sub-Committee noted further that the Technical Working Group, at NAV 44, prepared the Tables, given in (NAV 45/7, annex 3), as the first analysis of the instruments available to produce heading information and the instruments which require to be supplied with heading information, together with the accuracies attainable. The object of the Tables was to facilitate a study with the object of ensuring that the Organization had specified sufficient heading devices to meet all the needs of the carriage requirements and there was an urgent need for performance standards.

7.23 The Sub-Committee, having considered the report of the Technical Working Group at NAV 45 (NAV 46/7, paragraphs 2.3 to 2.4) and the proposal by Japan (NAV 46/7/2) agreed the draft performance standards for marine transmitting heading devices (THDs), given in annex 14 for adoption by the Committee.

7.24 The Committee was invited to delete the agenda item "User requirements for heading systems" from the Sub-Committee's work programme, as the work had been completed.

7.25 The Sub-Committee invited Member Governments to co-operate in the work of the ISO in developing the THD technical standards.

ADOPTION OF PERFORMANCE STANDARDS

7.26 Taking into account the above decisions, the Sub-Committee prepared draft MSC resolutions on adoption of new and amended performance standards to which the following new and amended recommended performance standards are attached:

.1 shipborne global positioning system (GPS) receiver equipment;

.2 shipborne GLONASS receiver equipment;

.3 shipborne DGPS and DGLONASS maritime radio beacon receiver equipment;

.4 shipborne combined GPS/GLONASS receiver equipment; and

.5 marine transmitting heading devices (THDs).

and was of the opinion that the performance standards for THDs should apply from 1 July 2002 and amended performance standards for shipborne radionavigational receiver equipment from 1 July 2003.

7.27 The Committee was invited to adopt the draft MSC resolutions on new and amended performance standards, given in annexes 10, 11, 12, 13 and 14, in accordance with resolution A.886(21) and bring them to the attention of Governments, manufacturers, shipowners and others concerned for implementation.

TECHNICAL WORKING GROUP

7.28 The Sub-Committee instructed the Technical Working Group to consider a number of other documents submitted under item 7. The outcome of the Working Group's discussion related to these documents concerning development of performance standards for bridge watch alarms would be circulated under the appropriate agenda item to NAV 47.

7.29 Members were invited to consider the report of the Technical Working Group, when circulated, and submit comments and proposals thereon for consideration at NAV 47.

8 ITU MATTERS, INCLUDING RADIOCOMMUNICATIONS ITU-R STUDY GROUP 8 MATTERS

8.1 The Sub-Committee recalled that, at its forty-fifth session, it had considered NAV 45/8 (Secretariat) containing the complete text of the Question approved by correspondence since the last Radiocommunication Assembly assigned to Study Group 8 (Question ITU-R No. 216-1/8 on Compatibility of radionavigation and radiolocation services operating in the bands 2 900 – 3 300 MHz and 5 350 – 5 650 MHz).

8.2 NAV 45 was of the opinion that Question No. 216-1/8 concerned ITU compatibility studies of services operating in the band 2 900 – 3 300 MHz which is used in part by the shipping industry for 3 GHz (10 cm or S band) radars. It was realized that an increasing number of mobile communication service providers are making plans to operate in and around the 3 GHz radar band and that this band is under extreme threat. The band moreover was of great importance to the Organization because of the superior performance of 3 GHz radars under adverse environmental conditions; many ships use the 3 GHz radar as their primary radar. The SOLAS Convention, however, limited the mandatory requirement for radar to a 9 GHz (3 cm or X band)

radar as this equipment provided compatibility with the SART for the GMDSS. Therefore, NAV 45, being of the opinion that better protection could be sought for the 3 GHz band if there would be a clearer SOLAS requirement for the carriage of a 3 GHz radar, agreed appropriate modifications to regulation V/20.

8.3 Being informed that COMSAR 4 had developed the IMO position to WRC-2000 (COMSAR 4/14, annex 6) and covered the above-mentioned matters, NAV 45 agreed that the IMO position should be expanded as indicated in paragraph 8.5 of document NAV 45/14 and instructed the Secretariat accordingly.

8.4 NAV 45 noted the ICAO position (NAV 45/INF.7) on critical concern to civil aviation to be considered at WRC-2000 and was of the opinion that this position concurred with the IMO position on protection of the frequency bands for existing and future GNSS.

8.5 The Sub-Committee noted that the ITU 2000 World Radiocommunication Conference (WRC-2000) had been held in Istanbul (from 8 May to 2 June 2000) which had discussed changes to the ITU Radio Regulations of relevance to the Organization. The Final Act of the Conference was not yet however available. The Sub-Committee was informed by the Secretariat that the outcome of the Conference concerning maritime matters will be brought to the attention of MSC 73 and COMSAR 5.

8.6 The IMO observer at the Conference reported that the band 2900 - 3300 MHz had not been threatened at WRC-2000 but subsequent ITU Conferences may well consider the possibility of sharing the band with other users. Also the ITU-R is known to be developing stricter limits for radar unwanted emissions which might increase the difficulties in correct operational functioning of some maritime safety services.

8.7 Taking into account the above, the Sub-Committee invited Member Governments to submit their comments and proposals on the issue to COMSAR 5.

8.8 The Sub-Committee was also informed that Working Party 8B of ITU-R Study Group-8 will hold its next meeting in October 2000 and will consider a draft revision of Recommendation ITU-R M.1371 (concerning the technical characteristics of the AIS). Given the importance of AIS as a future carriage requirement, the Sub-Committee prepared the liaison statement, given in annex 15, and, taking into account the urgency of the matter, instructed the Secretariat to submit this statement to Working Party 8B for consideration.

8.9 The Committee was invited to endorse the action taken.

9 IMO STANDARD MARINE COMMUNICATION PHRASES

9.1 The Sub-Committee recalled that MSC 68 had considered draft "Standard Marine Communication Phrases (SMCPs)" prepared by NAV 42 and had approved their dissemination by MSC/Circ.794. MSC 68 had also invited Member Governments and international organizations concerned to conduct trials using the SMCPs and to report the results of such trials well in advance for consideration by NAV 45, in order that the Sub-Committee could, in co-operation with the COMSAR and STW Sub-Committees, finalize the SMCPs. MSC 68 also had considered that, following this, a suitable draft Assembly resolution could be prepared for submission to the twenty-second session of the Assembly for adoption.

9.2 The Sub-Committee recalled further that MSC 71 (MSC 71/23, paragraph 20.33) had instructed NAV 45 to include, in the provisional agenda for NAV 46, an item on "IMO Standard Marine Communication Phrases", which was subsequently approved by MSC 72.

9.3 The Sub-Committee also recalled that at its forty-fifth session, it considered on a preliminary basis NAV 45/13 (Secretariat) summarizing the comments received on the results of the trials by Chile, Croatia, Germany, Iceland, Italy, Ukraine, Hong Kong, China, and ISF.

9.4 The Sub-Committee also noted that, STW 31 had agreed that the SMCP should be subject to a thorough review on a line-by-line basis and that the NAV Sub-Committee was the appropriate body to undertake the work. Noting the importance of the SMCPs, STW 31 had urged NAV 46 to complete the work and had invited the Committee to give appropriate instructions. STW 31 had invited Member Governments to submit results of any trials of SMCPs to NAV 46 and had recommended that experts in the provision of maritime English training be encouraged to participate.

9.5 The Sub-Committee further noted that STW 31 agreed that the draft IMO model course on Maritime English made reference to the SMCPs and therefore there was no need for a separate course book, and that the SMCP should be an indispensable part of any curriculum which was designed to meet the corresponding STCW requirements.

9.6 The Sub-Committee also took account of the concerns expressed by many delegations on the mandatory status of Part A of the revised Standard Marine Communication Phrases and the need to further retrain Pilots and VTS operators and agreed to review the mandatory status of Part A in the revised Standard Marine Communication Phrases.

Establishment of a drafting group

9.7 The Sub-Committee agreed to establish a drafting group (DG1) under the chairmanship of Dr. P. Trenkner (Germany), and instructed it, taking into account decisions of, and comments and proposals made in Plenary as well as relevant decisions of other IMO bodies, to:

.1 consider the three documents, namely NAV 46/9 (Germany), NAV 46/9/1 (Republic of Korea) and NAV 46/INF.4 (Germany);

.2 take into account the role of the human element including the Human Element Analysing Process (HEAP) given in MSC/Circ.878/MEPC/Circ.346 in all aspects of the issues considered; and

.3 prepare a draft Assembly resolution for submission to the twenty-second session of the Assembly for adoption.

9.8 Having received the report of the Drafting Group (NAV 46/WP.3), the Sub-Committee took action as summarized hereunder.

9.9 The Sub-Committee approved the amended draft Standard Marine Communication Phrases contained in MSC/Circ.794 as indicated in the revised SMCP, including a draft Assembly resolution, given in annex 16. It also agreed to forward it for submission to MSC 74 for consideration and approval before onward submission to the twenty-second session of the Assembly for adoption.

9.10 The Sub-Committee agreed that as decided by STW 31, STW 32 should clarify the use of the Standard Marine Communication Phrases to meet the requirements in Table A-II/1 of the STCW Code and also agreed the submission of revised Standard Marine Communication Phrases to COMSAR 5 for its review.

10 GUIDELINES RELATING TO SOLAS CHAPTER V

Guidelines for recording events related to navigation

10.1 The Sub-Committee recalled that at its forty-fifth session, it had noted that NAV 43, had concurred in a proposal by Germany and the Netherlands that guidelines for recording events related to navigation should be prepared and also cross-referenced in a footnote to regulation 27 and invited Members to submit proposals to NAV 44.

10.2 The Sub-Committee further recalled that no such submissions were received at NAV 44, and that, it had not considered regulation 27.

10.3 The Sub-Committee noted that, at its forty-fifth session, it had considered and approved regulation 27, as amended and decided to request the Committee to include in its work programme, a high-priority item on "Guidelines for recording events related to navigation" with a target completion date not later than the entry into force of the revised chapter V. This was subsequently agreed by MSC 72.

10.4 The Sub-Committee noted that no proposals had been received under this agenda item for which the target completion date is 2001. The Sub-Committee however also noted that the Assembly resolution on Guidelines for recording events related to navigation should be adopted by the Assembly ahead of the envisaged date for entry into force of the new revised SOLAS Chapter V, i.e. 1 July 2002. Therefore the said resolution should be adopted by the twenty-second Assembly in November 2001, and be developed in time for such adoption.

10.5 On the basis of a proposal by the Netherlands (NAV 43/5/1) and after lengthy discussion the Sub-Committee concluded that the draft Assembly resolution:

.1 should strictly adhere to the new regulation V/28 of the SOLAS Convention, and should be of a recommendatory nature;

.2 should restrict itself to the recording of events related to navigational issues; and

.3 should not duplicate other requirements for recording of events.

10.6 The United States proposed that entries on special events should include any over-riding operational condition requiring adjustment in the watchkeeping arrangements under STCW regulation VIII/1.

10.7 The Sub-Committee due to time constraints was unable to finalize the matter but developed a provisional draft Assembly resolution, given in annex 17. The Committee was invited to review and approve this proposed framework and to authorize the Sub-Committee to finalize its work at its forty-seventh session and forward the draft resolution directly to the Assembly for adoption at its twenty-second session.

10.8 The Sub-Committee invited Member Governments to submit proposals to NAV 47 to make progress on the matter, bearing in mind the target completion date of 2001.

Guidelines on Automatic Identification Systems (AIS) operational matters

10.9 The Sub-Committee noted that, at its forty-fifth session, it had agreed that for the introduction of the mandatory carriage requirements of AIS, it was essential to develop the guidelines for the operation of AIS for adoption by the twenty-second Assembly in 2001 so that it will become effective in time for the entry into force of amendments to chapter V. Accordingly, NAV 45 had requested the Committee to include a corresponding item in its work programme, which was subsequently agreed to by MSC 72.

10.10 The Sub-Committee also noted that in this context, MSC 72 considered a proposal by ICS which, strongly supporting the view that guidelines needed to be issued by IMO, had prepared such draft guidelines accordingly for consideration by the Committee (MSC 72/10/12) and by NAV 46 (NAV 46/10).

ICS was of the opinion that:

.1 the Guidelines should be restricted to shipborne operational matters only;

.2 the AIS hardware configuration on which the Guidelines were to focus should be that which the majority of ships would be likely to initially fit to satisfy the new SOLAS chapter V carriage requirements;

.3 a ship fitted with operational AIS equipment may be relieved from making manual reports to the appropriate authorities ashore, in areas where IMO-mandatory ship reporting systems exist;

.4 while AIS might assist the officer of the watch (OOW) in making collision avoidance decisions and, indeed, ships might, under certain circumstances, be detected by AIS alone, the COLREGs must be complied with at all times;

.5 the OOW should take particular care when attempting to match AIS target information with what has been observed from the ship, either visually or by radar;

.6 the OOW should also be aware that ships may be broadcasting information from ship sensors that only satisfy the performance standards required of them by SOLAS chapter V and certain information on ship's course and speed over the ground, etc. may not be available for transmission; and

.7 if the master believes that the continual operation of AIS might compromise the safety of his ship, he might switch the AIS off at any time.

10.11 The Sub-Committee also noted that, MSC 72 had agreed to instruct NAV 46 to consider documents MSC 72/10/8 and MSC 72/10/12 together with document NAV 46/10 in the context of its agenda item 10.2 - Guidelines on Automatic Identification System (AIS) operational matters.

10.12 Having considered documents NAV 46/10 (ICS), NAV 46/10/1 (IALA), MSC 72/10/8 (INTERTANKO) and MSC 72/10/12 (ICS) in some detail and noting that there was no contradiction between the two proposals from ICS and IALA, although their approach was different, the Sub-Committee established a Working Group and instructed it to consider:

.1 documents submitted under agenda item 10.2 NAV 46/10 (ICS) and NAV 46/10/1 (IALA) and those documents referred to NAV 46 by MSC 72 (MSC 72/10/8 and MSC 72/10/12); and

.2 documents NAV 46/15/2 (ICS, BIMCO, etc.), NAV 46/15/3 (United Kingdom, NAV 46/15/4 (IMPA) and NAV 46/INF.5, (see paragraph 15.13)

taking account of all decisions of Plenary and other IMO bodies (agenda item 2) and to:

.1 develop Guidelines on Automatic Identification Systems (AIS) operational matters;

.2 review Annex 2 of resolution A.485(XII) relating to recommendation on operational procedures for maritime pilots other than deep-sea pilots, taking into account the Guidelines on voyage planning (A.893 (21)), and list the pros and cons on the issues discussed for inclusion in, or exclusion from, the recommendations (see paragraph 15.13); and

.3 take into account the role of the human element and in particular the human element analysing process (HEAP) in all aspects of the issue concerned.

Report of the Working Group

10.13 Having received the report of the Working Group (NAV 46/WP.5) the Sub-Committee noted that the Working Group, after briefly examining the different approaches of the two documents NAV 46/10 and NAV 46/10/1 and, recognizing that some work had already been done by IALA to incorporate some of the ICS proposals in preparing their document, had agreed to take the annex to document NAV 46/10/1 (IALA) as the basic text for the guidelines, transferring the more technical information into the annex and using the relevant parts of the annex to document NAV 46/10 (ICS), as appropriate.

10.14 The Sub-Committee agreed that the guidance to be developed was mainly aimed at the ship personnel and only secondarily at manufacturers/producers of AIS and the text therefore needed to be simplified.

10.15 It was agreed that the AIS limitations needed to be identified and spelled out very early in the guidelines as a warning for those on board using it e.g. in the context of collision avoidance, in particular, the fact that different categories of ships are not equipped with AIS etc. Corresponding text from paragraphs 1.1 and 2.5 of the ICS document was subsequently combined with section 5 of the IALA paper and transferred into section 3.

10.16 In considering the possibilities of AIS in the context of mandatory ship reporting systems under SOLAS chapter V, the Sub-Committee agreed that, subject to amendments to such approved reporting systems, AIS messages could satisfy those requirements, took note of this for future approval of mandatory ship reporting system or for amending the existing ones and invited Member States concerned to equip their shore stations accordingly.

10.17 The Sub-Committee agreed that there was no need to refer to AIS in the COLREGs, as it was covered by the relevant general provisions.

10.18 The Sub-Committee recognized that the AIS display method would, as a basic requirement, use a three line alpha-numeric display. The user would not be swamped with data, since the display was selectable.

10.19 Dedicated graphical display of AIS information could also be made available. The use of AIS connected to external systems e.g. radar, ECDIS, etc. might also be possible would, however, require amendments of IMO performance standards for such equipment and should be further considered in the context of the integrated bridge systems (IBS).

10.20 It was a fact, however, that AIS graphical display was already being used in many cases today in the shipping industry.

10.21 The Sub-Committee agreed the use of AIS for short safety messages was not meant to replace GMDSS messages but was VTS-related information which usually would be acknowledged automatically.

10.22 The Sub-Committee, considering the issue of the master's discretion regarding switching off the AIS, in particular in busy shipping channels, such as the Malacca Straits, for safety reasons related to e.g. piratical attacks in those waters, agreed that although such action might not be desirable for VTS services, controlling these areas, and it might be better for the ship in question to have its position monitored at all times for the provision of immediate assistance by shore based authorities, it had to be left to the master to take that decision, not only in view of the safety but also the security of his ship.

10.23 Recalling its discussion of AIS display/interface with e.g. ARPA, ECDIS, etc. (see paragraph 10.19), the Sub-Committee agreed that the advantages and disadvantages of such displays needed to be spelled out clearly in the guidelines. The minimum display requirements were not considered very helpful and should be seen only as an interim solution. There was also a need to harmonize the navigational information presentation by different sensors.

10.24 The Sub-Committee agreed to invite Member Governments and relevant international organizations, such as IEC and ITU, to make proposals on the integration of AIS information in the context of the IBS to enhance the progress on the matter for consideration under the existing work programme item on IBS, target completion date 2001, at NAV 47.

10.25 In considering chapter 8 on user training, the Sub-Committee recalled that it had requested the STW Sub-Committee to consider the need for comprehensive guidance on training in the use of new navigation technology (see paragraph 5.6).

10.26 During the brief consideration of the revised draft guidelines in the working group, ICS expressed the wish that the following aspects be considered further to give the best possible guidance on these issues to the ship personnel:

.1 the use of AIS for collision avoidance (paragraph 3.1);

.2 the size available on the basic AIS screen for receiving safety messages (paragraph 4.1.2);

.3 DGNSS correction sent by VTS via AIS (paragraph 4.2.3); and

.4 the use of the word "tracking" in the context of AIS (paragraph 7.4).

10.27 The Sub-Committee, after considerable discussion, agreed in general the revised draft guidelines for the operational use of the shipborne automatic identification system (AIS), as set out in annex 18, for the Committee's consideration and approval in principle. Furthermore, the Sub-Committee invited the Committee to allow it to further amend and finalize the draft guidelines and the associated Assembly resolution at NAV 47 for submission directly to the twenty-second session of the Assembly for adoption.

10.28 The delegation of Cyprus did not agree that the Sub-Committee should ask the Committee to authorize it to report directly to the twenty-second session of the Assembly as described in paragraph 33 of NAV 46/WP.5. Cyprus pointed out that in accordance to paragraph 5.18 of the report of the last session of the Sub-Committee (NAV 45/14), the Sub-Committee was aware that the guidelines for the operation of AIS have to be adopted by the twenty-second Assembly session so that they become effective in time for the entry into force of the amendments to SOLAS chapter V, and knowing the procedures of the Organization regarding submission of the work of the Organization to the Assembly, the Sub-Committee had consciously tried to bypass the scrutinization of these guidelines by the Maritime Safety Committee.

10.29 The Sub-Committee further agreed to attach the draft guidelines to the liaison statement from IMO to ITU-R Working Party 8B (paragraph 8.8 refers).

11 COMPREHENSIVE REVIEW OF CHAPTER 13 OF THE HSC CODE

11.1 The Sub-Committee recalled that, at its forty-fifth session, it had considered the draft text of Chapter 13 of the draft HSC Code but was of the opinion that this issue could not be finalized pending decisions on the revision of SOLAS chapter V, taking into account the inter-relationship between SOLAS chapter V and chapter 13 of the HSC Code. Furthermore, NAV 45 was of the opinion that revision of SOLAS chapter V should consequently include an amendment to SOLAS regulation X/3.1, which presently refers to the existing regulation V/12.

11.2 NAV 45 had forwarded the draft text of Chapter 13 of the draft HSC Code to DE 43 with the provision that the text needed further amendment to align it with the new revised SOLAS chapter V. Accordingly, it also had requested the Committee to extend the target completion date to 2000, i.e. NAV 46.

11.3 The Sub-Committee noted that DE 43 discussed the inclusion of the requirements for voyage data recorders (VDR) at length. In the course of the discussion, some delegations had considered that the carriage requirements for VDR should be included in the draft Code and, having noted that NAV 46 would further revise chapter 13 thereof, suggested that NAV 46 should develop such requirements as part of the revision of draft chapter 13, taking into account the relevant decisions by MSC 72 on the revision of SOLAS chapter V and the provisions of draft revised SOLAS chapter V regarding VDR. Some other delegations were of the view that it would be premature to include requirements for the carriage of VDR in the Code as more information was needed to justify the inclusion of such requirements in the Code and put forward a request for such information. The Committee therefore was invited to note the outcome of the discussion on VDR and take action as appropriate. The Secretariat had been instructed to inform NAV 46 accordingly.

11.4 The Sub-Committee also noted that MSC 72 approved, subject to further contribution by NAV 46 and SLF 43, the draft International Code of Safety for High-Speed Craft, 2000 (2000 HSC Code) and the associated draft MSC resolution on adoption of the Code by MSC 73, as set out in document DE 43/18, annex 18.

11.5 The Sub-Committee further noted that, MSC 72 had requested it to develop, as part of the final revision of chapter 13 of the 2000 HSC Code, carriage requirements for VDR for inclusion in that Code, in line with the corresponding provisions of the approved draft revised SOLAS chapter V, which would apply only to new passenger high-speed craft and cargo high-speed craft of a certain size, including consideration of the application size threshold for new cargo high-speed craft, for submission to MSC 73. With regard to existing high-speed craft, MSC 72 had also requested NAV 46 to develop amendments to chapter 13 of the 1994 HSC Code to require the carriage of VDR on board passenger high-speed craft to which that Code applies, and convey them to DE 44 for further development and submission to MSC 74 for approval.

Establishment of a drafting group

11.6 The Sub-Committee agreed to establish a drafting group (DG2) under the chairmanship of Mr. T. Scheel (Norway) and instructed it, taking into account decisions and guidance of plenary as well as relevant decision of IMO bodies:

.1 to prepare draft amendments to regulation 3 of SOLAS chapter X giving reference to the new revised SOLAS chapter V;

.2 to prepare draft amendments on carriage requirements for VDR in chapter 13 of the HSC Code, 1994 and the HSC Code, 2000; and

.3 to prepare revised texts of draft chapter 13 of the HSC Code, 2000 to further align this chapter with the carriage requirements in the new revised SOLAS chapter V.

11.7 Having received the report of the Drafting Group (NAV 46/WP.2), the Sub-Committee took action as detailed below:

Amendments to SOLAS chapter X

11.8 The Sub-Committee agreed to replace the existing reference to SOLAS regulation V/12 by those to new draft regulations V/18, V/19 and V/20 of the new revised SOLAS chapter V, as given in annex 19, for consideration and approval by MSC 73.

The 2000 HSC Code

11.9 As agreed at NAV 45 (NAV 45/14, paragraphs 13.14 to 13.15), the Sub-Committee considered draft chapter 13 of the 2000 HSC Code with a view to align it with the carriage requirements of regulation V/19 of the new draft revised SOLAS chapter V.

11.10 Japan supported by other delegations was of the view that main amendments related to new carriage requirements for nautical charts and nautical publications including ECDIS, back-up arrangements for ECDIS, GNSS receiver and AIS. The Sub-Committee concurred with the proposals by Japan and also with proposals by the United States and Germany concerning sound reception systems and radar reflector.

11.11 The Sub-Committee agreed to amend chapter 13 of the 2000 HSC Code to align it with the terminology in the new draft revised SOLAS chapter V and insert the text of paragraphs 5, 6 and 7 of draft regulation V/18 under a new heading approval of systems and equipment and performance standards, and agreed the revised text, as amended by plenary, given in annex 20, for submission to MSC 73, in the context of the Committee's approval of the draft International

Code of Safety for High-Speed Craft, 2000 (2000 HSC Code) (paragraph 13.12 of MSC 72/23 refers).

The 1994 HSC Code

11.12 In considering draft amendments to chapter 13 of the 1994 HSC Code, the delegation of Japan supported by other delegations was of the opinion that it should be amended in line with the draft revised SOLAS chapter V in order to include the requirements applicable to existing high-speed craft as specified in the revised chapter, which was the mandate given to the Sub-Committee by MSC 69. However, the Sub-Committee having noted the instructions of MSC 72 did not consider amendments to chapter 13 of the 1994 HSC Code other than those for VDR. However, it was pointed out there is a need for further amendments to the 1994 HSC Code, i.e. to include requirements for AIS and for nautical charts permitting the use of ECDIS in craft subject to the 1994 Code. The Sub-Committee urged Members to submit relevant proposals to MSC 73 for consideration and adoption.

11.13 The Sub-Committee agreed the draft amendments to chapter 13 of the 1994 HSC Code on carriage requirements for VDR, as amended by plenary, as given in annex 21, for onward transmission to DE 44 for further development and submission to MSC 74 for approval.

12 DEVELOPMENT OF GUIDELINES FOR SHIPS OPERATING IN ICE-COVERED WATERS

12.1 The Sub-Committee recalled that, at its forty-fourth session, it had given preliminary consideration to the matter, and considering the heavy workload envisaged at NAV 45, invited the Committee to postpone further consideration of this issue until NAV 46. MSC 70 had agreed with this request and had decided that work should start at NAV 46.

12.2 The Sub-Committee further recalled that, at its forty-fifth session, it noted that MSC 71 had instructed the DE (co-ordinator), BLG, FP, COMSAR, NAV, SLF and STW Sub-Committees to conduct their work on this issue in accordance with the approved framework (MSC 71/23, paragraph 9.16) with immediate effect, and had invited the MEPC to concur with this course of action. It had also invited Members to submit comments/proposals on this issue for consideration at NAV 46.

12.3 The Sub-Committee was informed that DE 43 had established a working group to review the text of the draft guidelines with the following terms of reference:

.1 using as basic document DE 43/12/3 and, taking into consideration the other documents submitted on the subject (DE 43/12, DE 43/12/1, DE 43/12/2, DE 43/12/4 and DE 43/12/5) and comments made in plenary, to review the text of the draft Guidelines to ensure that they fully conform to the instructions of MSC 71 (DE 43/12/2, paragraph 4), i.e.:

.1.1 the recommendatory guidelines should be developed only for SOLAS 74 ships operating in ice-covered waters, for dissemination under cover of an MSC circular;

.1.2 the application of the guidelines in areas north of 60ºN should be resolved so that ice-free waters in those areas are not covered;

.1.3 Antarctic waters are, for the time being, to be excluded from the application of the guidelines;

.1.4 any provisions in the current draft guidelines, which are inconsistent with international law, including the provision for prior notification, should be removed;

.1.5 any clauses that appear to indicate that they are mandatory should be redrafted in such a way that their recommendatory nature is clearly demonstrated;

.1.6 only provisions additional to existing SOLAS requirements taking account of the climatic conditions of ice-covered waters should be included and the need for such additional provisions should be clearly demonstrated;

.2 to identify clearly the areas where input from other Sub-Committees should be sought;

.3 to provide advice on whether or not barges should be included in the guidelines;

.4 to consider the need for any survey and certification provisions which might be different to the corresponding SOLAS requirements; and

.5 to present a report (part 1) to plenary on Thursday, 13 April on the work accomplished thus far, and continue working through the week to prepare, in collaboration with the Secretariat, part 2 of the report for consideration by DE 44 with a view to finalizing the item as scheduled.

12.4 The Sub-Committee noted that DE 43 further agreed to refer the report of the working group (DE 43/WP.10) to DE 44 together with the status report of the draft guidelines (Part 2 of the report of the Working Group), which would be prepared in collaboration with the Secretariat.

12.5 The Sub-Committee considering the fact that the report of working group at DE 43 would be discussed at DE 44 in March 2001 only and also that no specific proposals had been received on the issue for this session decided to invite the Committee to extend the target completion date of this item to 2001, so that it can be included in the provisional agenda as and when DE requires NAV input.

13 WORK PROGRAMME AND AGENDA FOR NAV 47

13.1 The Sub-Committee noted that MSC 72, as proposed by NAV 45, had included in the Sub-Committee's Work Programme two high priority items, namely, on "Guidelines for recording events related to navigation", with a target completion date of 2001" and "Guidelines on automatic identification system (AIS) operational matters" with a target completion date of 2001. It also had agreed, as requested by STW 31, to retain the item on "Training and certification of maritime pilots and revision of resolution A.485(XII)", with a target completion date of 2000 in the Sub-Committee's work programme.

13.2 Taking into account the progress made at this session and the provisions of the agenda management procedure, the Sub-Committee (NAV 46/WP.6) prepared a revised work programme and provisional agenda for NAV 47 based on those approved by MSC 72 (NAV 46/2/1, annexes 1 and 2), as set out in annexes 22 and 23 respectively, for consideration

and approval by the Committee. While reviewing the work programme, the Sub-Committee agreed to invite the Committee to:

.1 delete the following work programme items, as work on them has been completed.

.1.1	item H.1	Guidelines on ergonomic criteria for bridge equipment and layout;	2000
.1.2	item H.2	IMO Standard Marine Communication Phrases (in co-operation with COMSAR and STW);	2000
.1.3	item H.4	Amendments to the COLREGs;	2000
.1.4	item H.5	Review of performance standards for shipborne satellite radionavigational receivers;	2000
.1.5	item H.9	Comprehensive review of chapter 13 of the HSC Code;	2000
.1.6	item L.1	Performance standards for navigation systems and equipment; and	-
.1.7	item L.4	User requirements for heading systems	2000

.2 extend the target completion date of the following work programme items:

.2.1	item H.10	Training and certification of maritime pilots and revision of resolution A.485(XII); and	2001
.2.2	item L.2.	Development of guidelines for ships operating in ice-covered waters (co-ordinated by DE);	2001

.3 include two new work programme items:

.3.1	item H.2	Revision of resolution A.815(19) on World-Wide radionavigation system; and	2001
.3.2	item H.6	Guidelines on Voyage Data Recorders (VDR) ownership and recovery	2001

Arrangements for the next session

13.3 The Sub-Committee anticipated that Working Groups on the following subjects may be established at NAV 47:

.1 Ships' Routeing (item 3);

.2 Technical matters (items 7 and 8); and

.3 Guidelines relating to SOLAS chapter V (item 10).

Date of the next session

13.4 The Sub-Committee noted that its forty-seventh session had been tentatively scheduled to be held from 2 to 6 July 2001.

14 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR 2001

In accordance with rule 16 of the Rules of procedure of the Maritime Safety Committee, the Sub-Committee unanimously re-elected Mr. K. Polderman (The Netherlands) as Chairman and Dr. V.I. Peresypkin (Russian Federation) as Vice-Chairman for 2001.

15 ANY OTHER BUSINESS

Pilot transfer arrangements

15.1 The Sub-Committee noting the adoption by the Assembly of resolution A.889(21) – Pilot transfer arrangements, also noted that, at the twenty-first session of the Assembly, the Technical Committee (Committee 2) was reluctant to consider a proposal by the delegation of Italy calling for a new type of pilot ladder steps to be included in paragraph 2.1.2 of the Annex to that resolution and, instead, had suggested that Italy consider submitting their proposal to NAV 46 for consideration (A 21/5(b)/2, paragraph 24 refers).

15.2 The Sub-Committee considered document NAV 46/15 submitted by Italy, in pursuance of the Assembly's suggestion, which was supported by a number of delegations and agreed on an amendment to resolution A.889(21) – Pilot transfer arrangements – providing for an alternative type of pilot ladder as proposed by Italy. The Sub-Committee prepared the draft amendment of resolution A.889(21) as given in annex 24 for adoption at the twentieth-second session of the Assembly.

15.3 A few delegations however, though supporting the Italian proposal in principle, raised further questions about the strength and suitability of the alternative ladder and requested Italy to carry out further tests and trials. These Members specified that the following issues be addressed in such tests and trials:

.1 determine the ice formation characteristics of the modified steps by seawater spray testing in extreme cold (0°F/-18°C) non-pilotage situation (e.g., fire-hose spray and mist on a modified ladder against a ships side whilst in port). The objective would be to determine if resulting ice formation makes this form of ladder step less safe than a traditional step. The duration and conditions of the test should be fully documented;

.2 explore the consequences of use of the handhold feature on an ice encrusted step by a person wearing wet gloves. The objective would be to determine if the pilot's hand would be trapped in a glove frozen to the ladder. This test should be conducted in extreme cold conditions as above;

.3 modified ladders should be deployed on a number of Italian/others flag ships, particularly those expected to call in cold weather ports during winter. The assigned pilots should be notified in advance that a modified ladder is in use. The views of any pilot who elects to use the handhold future of a modified ladder should be recorded and included in the report of the trials; and

.4 the results of tests and trials described above should be provided to IMPA for further distribution to concerned national pilot associations.

15.4 The Italian delegation indicated its readiness to carry out the tests and trials, and informed the Sub-Committee that it would submit the results well in time for consideration of the issue by the Assembly.

15.5 The delegation of Japan stated that the pilot transfer arrangements proposed by Italy would result in substantial increase in the weight as compared with conventional pilot ladders, and consequently might cause problem for handling at storing them by single person. That delegation requested the delegation of Italy that the report submitted to the next session include the assessment of the ease of handling of the proposed pilot transfer arrangements.

International call sign for shore signal stations

15.6 The Sub-Committee considered a proposal by the United States (NAV 46/15/1) requesting it to approve the creation of a unique call sign for shore signal stations, consisting of the letter "Z" with one numeral.

15.7 The United States informed the Sub-Committee that, [while the 1931 International Code of Signals, Vol. I (Visual) added the single letter "Z" "to be used to address or call shore stations," the current International Code of Signals, has no provision for calling, addressing, or indicating shore signal stations. The "Z" flag now has two meanings (I require a tug or I am shooting nets). The NATO/Allied system uses an alphabetic "flag superior" (type indicator) plus one or two numerals for ship visual call signs. Addition of a numeral to the "Z" flag would create a signal that conforms to that system.

15.8 The Sub-Committee approved the proposed draft amendment to the Code as given in annex 25, and invited the Committee to adopt it in accordance with resolution A.187(VI), and also recommended that the proposed amendment comes into force on 1 January 2003.

Training and certification of maritime pilots and revision of resolution A.485(XII)

15.9 The Sub-Committee recalled that NAV 45 had considered and agreed a draft revised text of annex 2 - Recommendation on operational procedures for maritime pilots other than deep-sea pilots to resolution A.485(XII, and had conveyed the approved draft revised text to STW 31.

15.10 The Sub-Committee noted that, at STW 31, ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO (STW 31/4/1) had considered the revised text of Annex 2 and recalled that the Committee, at its sixty-ninth session (MSC 69/22, paragraph 13.14), had noted that Master Pilot Information Exchange forms would be used by ships and pilotage organizations, as appropriate; furthermore, that NAV 45 had developed Guidelines for voyage planning that included voyage planning in those areas where a pilot would be on board which also included a requirement for account to be taken of available port information; ICS had recently revised its Bridge Procedures Guide that included guidance on 'Passage planning and pilotage' and 'Navigation with a pilot on board' and also included example formats of Master Pilot Exchange Information forms. Against this background, ICS and others proposed amendments to Annex 2 of resolution A.485(XII).

15.11 The Sub-Committee was informed that, STW 31 noting that the proposed amendments were related to the operational requirements in Annex 2 of resolution A.485(XII), did not consider it appropriate to offer comment on the proposals which it considered should more

properly be made by NAV. The Secretariat had been instructed to convey document STW 31/4/1 to the NAV Sub-Committee for consideration of the proposed amendments to the Recommendation on operational procedures for maritime pilots other than deep-sea pilots, and to request the NAV Sub-Committee to finalize its work on this Recommendation to enable STW 32 to complete its work on the revision of resolution A.485(XII).

15.12 The Sub-Committee further noted that having considered the view of STW 31, MSC 72 instructed it to re-consider the issue at its forty-sixth session under its agenda item on "Any other business" and to convey the outcome of its consideration to STW 32.

15.13 The Sub-Committee, considered STW 31/4/1 (ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO), NAV 46/15/2 (ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO), NAV 46/15/3 (United Kingdom), NAV 46/15/4 (IMPA) and NAV 46/INF.5 (ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO) and established the Working Group (see paragraph 10.12).

Report of the Working Group

15.14 Having received the report of the Working Group (NAV 46/WP.5), the Sub-Committee noted that the Working Group agreed to take NAV 45/14, annex 12, as agreed by NAV 45, as basic document and to consider the proposed amendments thereto, as set out in the revised text of document NAV 46/15/2, annex.

15.15 As regards the use of the English language on the bridge, the Sub-Committee recalled that:

.1 the relevant provision of draft SOLAS regulation V/14.4 already contains a similar provision; and

.2 paragraph 5 of the current recommendations provides for the use of SMCP.

15.16 In relation to communications with external parties, the Sub-Committee noted the ICS opinion that:

.1 the bridge personnel can monitor the pilot only when it can be understood what he/she is doing; and

.2 the use of SMCPs may not be sufficient for such understanding.

15.17 The Sub-Committee, having discussed this issue at length could not find a consensus thereon and decided to defer further consideration of the revised text of resolution A.485(XII), Annex 2 to the next session.

15.18 The Sub-Committee invited the Committee to include the item on revision of resolution A.485(XII), Annex 2 recommendation on Operational procedures for maritime pilots other than deep-sea pilots, in its work programme and agenda for NAV 47, as a separate item.

15.19 The Sub-Committee noted that good progress had been made and urged Member Governments to submit proposals on this issue to NAV 47.

Safety of passenger submersible craft

15.20 The Sub-Committee recalled that, at its forty-fifth session, it had considered (NAV 45/10) submitted by the Secretariat and approved section 2.4.5 of the draft Guidelines for the design, construction and operation of passenger submersible craft, as set out in annex 2 to DE 43/14, and instructed the Secretariat to convey the approved text to DE 43.

15.21 The Sub-Committee noted that DE 43 had considered document DE 43/14/1 containing the latest version of the draft Guidelines, except for the outcome of COMSAR 4 (section 2.4.6) and NAV 45 (section 2.4.5), and IACS (DE 43/INF.8) on their interpretation for viewports in passenger submersible craft and, recognizing that this item had to be finalized at that session, had agreed to prepare a consolidated text of the draft Guidelines incorporating all the aforementioned contributions. Having reviewed the above consolidated text (DE 43/WP.9), DE 43 had made further changes, in particular to the Preamble and to some navigation provisions, and had agreed to the draft Guidelines for the design, construction and operation of passenger submersible craft, as set out in annex 10 for submission to MSC 73 with a view to approval and dissemination as appropriate. Acknowledging that the modifications made to the navigation provisions might necessitate expert sanctioning, DE 43 also had agreed to invite NAV 46 to concur with the action taken regarding paragraph 2.4.6.4 of the said draft Guidelines, and to inform MSC 73 accordingly, which was subsequently noted by MSC 72.

15.22 The Sub-Committee reviewed paragraph 2.4.6.4 of the said draft Guidelines (NAV 46/2/1, annex 4) and was of the opinion that the underwater location device should be reinstated and also these craft should be fitted with a speed and distance device.

15.23 The Sub-Committee amended the draft Guidelines as given in annex 26 for forwarding to MSC 73.

Casualty analysis

15.24 The Sub-Committee recalled that, at its forty-third session, as requested by FSI 5, it had reviewed the annex to the document (FSI 5/10/3) on the report of the correspondence group on casualty analysis and had noted that the analysis carried out showed that human factors, with the ships' officers failing to apply basic seamanship to situations of potential risk, predominated the causes of the nine casualties analysed.

15.25 NAV 43 was of the opinion that the analysis was very broad; only 1 and 3 of groundings/strandings have navigational connotations but only indicate poor seamanship and had suggested that any future analysis prepared and conveyed to it for review should contain specific recommendations on possible action that should be taken and instructed the Secretariat to bring the above to the attention of FSI.

15.26 The Sub-Committee also recalled that FSI 6 considered its comments (FSI 6/2/2) on casualty analysis and had decided that it would only refer to the relevant IMO bodies those recommendations which are included in the reports of investigation received from Member States. FSI 6 had agreed that, whilst it could analyse casualties to determine relevant information, including contributing causes, for transmission to the relevant IMO bodies, recommendations for future specific actions based upon casualty information could best be developed by these bodies.

15.27 The Sub-Committee reviewed the annex to the document (FSI 8/19, paragraph 11.11.5 and annex 4) on the new report of the correspondence group on casualty analysis at FSI 8.

15.28 The Sub-Committee noting that no specific action had been requested of it by FSI 8, reiterated the opinion expressed at its forty-third session that that any future analysis prepared and conveyed to it for review should contain specific recommendations on possible action that should be taken.

Investigation into near misses

15.29 The Sub-Committee recalled that at its forty-fifth session, it had noted with interest the information provided by Japan (MSC 71/INF.8), as referred to it by the Committee, presenting conclusions on the investigation into near misses emanating from the operations on ship's navigation bridges and highlighting the need for consideration of important human elements matters with regard to operations on the navigating bridge.

15.30 The Sub-Committee was informed that MSC 72 subsequently had noted of the information provided by Japan in document MSC 72/INF.9 and instructed NAV 46 to consider, in detail the information submitted by Japan.

15.31 The Sub-Committee considered MSC 72/INF.9 and was of the opinion that the document was a more thorough analysis of the research undertaken on the topic. It again noted with interest the information provided by Japan (MSC 72/INF.9), presenting conclusions on the investigation into near misses relating to operations on ship's navigation bridges, which highlights the need for consideration of important human elements about operations on the navigating bridge.

15.32 The Sub-Committee was also of the opinion that the recommendations in the document (MSC 72/INF.9) specifically addressing navigational issues were already being addressed adequately.

VDR operational matters including recovery after an accident

15.33 The Sub-Committee recalled that, it had informed MSC 72 that, at NAV 45, ICS (NAV 45/5/1) had sought guidance from the Sub-Committee as to who would legally own the data logged by a VDR and what would be the extent of obligations placed on the ship to recover its VDR after an incident and, in particular, after an incident that resulted in the ship sinking. ICS (MSC 72/10/11) had noted the guidance provided by the United States (NAV 45/14, paragraphs 5.32 and 5.33) but requested further guidance from the Committee. Having considered the issue briefly, MSC 72 had decided to:

.1 instruct the Secretariat to seek the advice of IMO's Legal Office on this issue; and

.2 refer the relevant part of document MSC 72/10/11, together with the legal advice received, to NAV 46 (agenda item 15 - Any other business) for consideration and provision of further guidance.

15.34 As instructed by the Committee, the Secretariat updated the Sub-Committee with the advice prepared by the Organization's Legal Office on this matter.

15.35 The main conclusions of the Legal Office advice are as follows:

.1 Obligation to retrieve VDRs

The IMO Code on Investigation provides that the lead investigating State would be custodian of records and evidence. This means that during an investigation the lead investigating State has rights over evidence, including VDRs.

The IMO Code on Investigation makes neither the investigating authority nor the shipowner responsible for recovery of VDRs, though the investigating authority would appear to have rights to claim custody and is obliged to arrange for the read-out of the VDR. The new SOLAS chapter V, Regulation 20 does not contain any requirement for responsibility for recovery of the VDRs.

.2 Ownership of data logged by VDRs

IMO regulations are silent with respect to ownership of data logged by VDRs. However, "ownership" of the data should be distinguished from "custody" of the data. Under the IMO Code on Investigations, during an investigation, custody of the records or evidence (including VDR and data) gathered by the investigation would be the responsibility of the lead investigating State.

Accordingly, it seems that for the purpose of determining compliance with a safety or pollution prevention regulation following a casualty, the question of ownership rights of the shipowner to the VDR or Data, howsoever determined, is not the main issue. Any ownership rights will be overridden for the duration of the investigation. Therefore, ownership, as such, is not necessarily the overriding factor to be considered in this situation.

How the recorded information is handled on completion of the investigation would differ depending upon jurisdictional claims of, for example, the flag State, coastal State and the lead investigating State; and also upon applicable domestic legislation and practice in different States.

15.36 The Sub-Committee further concluded that there five basic issues that needed further consideration, namely:

.1 recovery of VDR;

.2 custody of VDR/data;

.3 ownership of VDR/data;

.4 read-out of VDR/data; and

.5 access to the data.

15.37 The Sub-Committee was also of the opinion that the involvement of the FSI Sub-Committee would be necessary as the IMO Code for the Investigations of Marine Casualties and Incidents (resolution A.849(20)) had primarily been developed by FSI, and the items indicated in paragraph 15.36, are related to the aforementioned Code.

15.38 The Sub-Committee also agreed to request the Committee to include a new agenda item "Guidelines on Voyage Data Recorders (VDR) ownership and recovery" in the Sub-Committee's work programme and in the agenda for its next meeting to further progress on the matter.

Threshold warnings for automated propulsion systems

15.39 The Sub-Committee recalled that, at its forty-fifth session, in the context of the revision of SOLAS chapter V, it had invited DE 43 to comment on draft regulation 19.3*bis* thereof relating to automated propulsion systems controlled by computer systems.

15.40 The Sub-Committee noted that, DE 43 discussed the proposals and had agreed that the text proposed by IACS in document DE 43/17/1 was preferable from the engineering viewpoint and that, therefore, the regulation would be better placed in chapter II-1. DE 43 had also agreed with the suggestion that automated propulsion systems controlled by computers should be linked to the engineers' quarters to alert them of an imminent shutdown, and had instructed the Secretariat to convey the above decisions together with paragraph 9 of DE 43/17/1 to NAV 46 for appropriate action.

15.41 The Sub-Committee also took note that, the Drafting Group convened at MSC 72 to finalize draft SOLAS chapter V agreed to delete paragraph 19.3*bis* from the revised text of regulation 19, and that the Committee had concurred with this.

15.42 The delegation of the United States was of the opinion that the draft regulation as proposed by DE 43 met the original intent and it could support the new text. Furthermore, it agreed with DE 43's view that the regulation should be placed in SOLAS chapter II-1 and recommended that NAV 46 should concur with the draft as prepared by DE, and invite DE to include it as a draft amendment to SOLAS chapter II-1, in the next cycle of amendments to the SOLAS Convention.

15.43 The Sub-Committee agreed that in view of the above there was no need for any further action by it.

Foundering of the small coastal passenger vessel M.V. Cahaya Bahari

15.44 The delegation of Indonesia, referring to the foundering of the small coastal passenger vessel **M.V. Cahaya Bahari**, reiterated the great importance the Government of Indonesia attaches to the maintenance of safety standards by vessels flying the Indonesian flag or vessels sailing within the Indonesian waters. They then explained that the incident in question was not due to the lack of safety standards by the vessel concerned. In fact, the incident had occurred when the **M.V. Cahaya Bahari**, a wooden ship, was on her routine liner service between Tobelo, North Maluku and Bitung, North Sulawesi and a group of people, because of an intercommunal strife that has been going on for some time in the island, attempted to take shelter on board the ship. This resulted in overloading the vessel’s capacity of passengers. The incident was obviously one which had taken place “on the spur of the moment” – which did not allow the local authority to take preventive measures on the spot. Indonesia being a country consisting of a large number of islands, it is very difficult to prevent such incidents at the right time and mobilise resources on the spot to be able to cope with them promptly.

The Indonesian delegation reassured the Sub-Committee that the Government of Indonesia, having learned a lesson from the unfortunate incident referred to above, would take all possible measures to prevent recurrence of such incidents in future. Indonesia continues to be committed to the maintenance of maritime safety and environmental protection standards in conformity with the objectives of IMO.

Expression of appreciation

15.45 The Sub-Committee expressed its appreciation to the following delegates, who had recently relinquished their duties, or were transferred to other duties, for their invaluable contribution to its work and wished them every success in their new duties.

.1 Mr. E. Monnerup (Denmark) (on retirement);

.2 Captain Raúl Samaniego-Granja (Ecuador) (returning home);

.3 Mr. Jean-Marc Schindler (France) (returning home);

.4 Mr. P. Escherich (Germany) (returning home);

.5 Dr. E. Conte (Italy) (returning home);

.6 Captain Alberto Revoredo, (Peru) (returning home);

.7 Captain Luis Díaz Monclús (Venezuela) (returning home); and

.8 Mr. O. Marumoto, Associate Professional Officer, Navigation Section, MSD (returning home to take up new duties).

15.46 The Sub-Committee also expressed appreciation to the International Maritime Pilots Association (IMPA) on the occasion of its 30th anniversary for their valuable services rendered to the maritime community over the past years.

15.47 The representative of IMPA took the opportunity to express his profound gratitude and appreciation to the Sub-Committee for the recognition that had been bestowed upon IMPA.

16 ACTION REQUESTED OF THE COMMITTEE

16.1 The Committee, at its seventy-third session, is invited to:

.1 adopt, in accordance with resolution A.858(20):

.1 the new traffic separation schemes, including associated routeing measures, along the Peruvian coast (paragraph 3.3 and annex 2);

.2 the new traffic separation schemes, including associated routeing measures, in the approaches to the River Humber (paragraph 3.9 and annex 2);

.3 the amended traffic separation schemes, including associated routeing measures, in Prince William Sound (paragraph 3.11 and annex 2); and

.4 the proposed mandatory ship reporting system "Off Les Casquets and the adjacent coastal area" (paragraph 3.17 and annex 3);

.2 adopt, subject to confirmation by the Assembly, the proposed draft amendments to the General Provisions on Ships' Routeing (paragraphs 3.21 and 3.24 and

annex 4); and the proposed mandatory no anchoring areas for Flower Garden Banks in the north-western Gulf of Mexico (paragraph 3.27 and annex 6);

.3 adopt the proposed draft amendments to resolution MSC.43(64) on Guidelines and Criteria for Ship Reporting Systems (paragraph 3.25 and annex 5);

.4 adopt, in accordance with COLREG article VI/(2), the proposed amendments to the Collision Regulations and approve the associated draft Assembly resolution for submission to the twenty-second session of the Assembly for adoption of both (paragraph 4.29 and annex 7);

.5 approve the draft MSC Circular on Guidelines on Ergonomic Criteria for Bridge Equipment and Layout (paragraph 6.7 and annex 8);

.6 approve the draft revised text of resolution A.860(20) on Maritime Policy for a future Global Navigation Satellite System (GNSS), for submission to the twenty-second session of the Assembly for adoption (paragraph 7.7 and annex 9);

.7 adopt, in accordance with resolution A.886(21), the proposed draft MSC resolutions on:

.1 revised Performance Standards for shipborne Global Positioning System (GPS) receiver equipment (paragraph 7.27 and annex 10);

.2 revised Performance Standards for shipborne GLONASS receiver equipment (paragraph 7.27 and annex 11);

.3 revised Performance Standards for shipborne DGPS and DGLONASS maritime radio beacon receiver equipment (paragraph 7.27 and annex 12);

.4 revised Performance Standards for shipborne combined GPS/GLONASS receiver equipment (paragraph 7.27 and annex 13); and

.5 Performance Standards for marine transmitting heading devices (THDs) (paragraph 7.23 and annex 14);

.8 endorse the action of the Sub-Committee in submitting a liaison statement to ITU-R Working Party 8B (paragraphs 8.8 and 8.9 and annex 15);

.9 note that the Sub-Committee has agreed to the amended draft Standard Marine Communication Phrases and the associated draft Assembly resolution for submission to MSC 74 for consideration and approval, subject to comments by COMSAR 5 and STW 32, and subsequent submission to the twenty-second session of the Assembly for adoption (paragraph 9.9 and annex 16);

.10 review and approve, in principle, the proposed draft framework of Guidelines for recording events related to navigation and the associated draft Assembly resolution; and authorize the Sub-Committee to finalize them at its forty-seventh session for submission directly to the twenty-second session of the Assembly for adoption (paragraph 10.7 and annex 17);

.11 review and approve, in principle, the draft Guidelines for the operational use of the shipborne automatic identification systems (AIS); and authorize the Sub-Committee to finalize them, together with the associated draft Assembly resolution, at its forty-seventh session for submission directly to the twenty-second session of the Assembly for adoption (paragraph 10.27 and annex 18);

.12 approve the new references to regulation 12 of the draft revised SOLAS chapter X (paragraph 11.8 and annex 19);

.13 approve the draft revised text of chapter 13 of the 2000 HSC Code in the context of the approval of the 2000 HSC Code (paragraph 11.11 and annex 20);

.14 approve the revised text of chapter 13 of the 1994 HSC Code for transmission to DE 44 (paragraph 11.13 and annex 21);

.15 approve the proposed draft amendment to resolution A.889(21) - Pilot transfer arrangements, for submission to the twenty-second session of the Assembly for adoption (paragraph 15.2 and annex 24);

.16 adopt, in accordance with resolution A.187(VI), the proposed draft amendment to the International Code of Signals (paragraph 15.8 and annex 25);

.17 note the deferral of the draft revised text of annex 2 (Recommendation on operational procedures for maritime pilots other than deep-sea) to resolution A.485(XII) to NAV 47 for further consideration (paragraph 15.17);

.18 note draft section 2.4.6 (Navigation) of the draft Guidelines for the design, construction and operation of passenger submersible craft (paragraphs 15.22 and 15.23 and annex 26), as finalized by the Sub-Committee for inclusion in the Guidelines being prepared by the DE Sub-Committee; and

.19 approve the report in general.

16.2 In reviewing the work programme of the Sub-Committee, the Committee is invited to consider the revised work programme suggested by the Sub-Committee (annex 22) in general and, in particular, to:

.1 delete "Guidelines on ergonomic criteria for bridge equipment and layout", as the task has been completed (paragraph 6.8);

.2 delete "IMO Standard Marine Communication Phrases (In co-operation with COMSAR and STW) as the task has been completed (paragraph 13.2.1.2);

.3 delete "Amendments to the COLREGs" as the task has been completed (paragraph 13.2.1.3);

.4 delete "Review of performance standards for shipborne satellite radionavigational receivers" as the task has been completed (paragraph 7.18);

.5 delete "Comprehensive review of chapter 13 of the HSC Code" as the task has been completed (paragraph 13.2.1.5);

.6 delete "Performance standards for navigation systems and equipment" as the task has been completed (paragraph 13.2.1.6);

.7 delete "User requirements for heading systems" as the task has been completed (paragraph 7.24);

.8 extend the target completion date of "Training and certification of maritime pilots and revision of resolution A.485(XII)" to 2001 (paragraph 15.18);

.9 extend the target completion date of "Development of guidelines for ships operating in ice-covered waters (co-ordinated by DE)" to 2001 (paragraph 12.5);

.10 include "Revision of resolution A.815(19) on World-Wide radionavigation system" with a target completion date of 2001 (paragraph 7.11); and

.11 include "Guidelines on Voyage Data Recorder (VDR) ownership and recovery" with a target completion date of 2001 (paragraph 15.38).

16.3 The Committee is also invited to approve the proposed agenda for the Sub-Committee's forty-seventh session (annex 23) which has been developed using the agenda management procedure.

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ANNEX 1

AGENDA FOR THE FORTY-SIXTH SESSION INCLUDING A LIST OF DOCUMENTS

1 Adoption of the agenda

NAV 46/1	-	Secretariat
NAV 46/1/1	-	Secretariat

2 Decisions of other IMO bodies

NAV 46/2	-	Secretariat
NAV 46/2/1	-	Secretariat

3 Routeing of ships, ship reporting and related matters

NAV 46/3 and Rev.1	-	Peru
NAV 46/3/1	-	United States
NAV 46/3/2	-	United States
NAV 46/3/3	-	United States
NAV 46/3/4	-	France and the United Kingdom
NAV 46/3/5	-	Yemen
NAV 46/3/6	-	United Kingdom
NAV 46/3/7	-	United Kingdom
MSC 72/10/13	-	France
NAV 46/INF.3	-	United Kingdom
NAV 46/INF.7	-	United Kingdom

4 Amendment to the COLREGs

NAV 46/4	-	Chairman of the Ships' Routeing Working Group
NAV 46/4/1	-	Hong Kong, China
NAV 46/4/2	-	Australia
NAV 46/INF.2	-	FOEI

5 Integrated Bridge Systems (IBS) operational aspects

(No documents submitted)

6 Guidelines on Ergonomic criteria for bridge equipment and layout

NAV 46/6	-	IEC
NAV 46/INF.6	-	ISO

7 Navigational aids and related matters

NAV 46/7 - Chairman, TWG

7.1 World-wide radionavigation systems

NAV 46/7/1 - Secretariat
NAV 46/7/3 - France, Finland, the Netherlands, Sweden and the United Kingdom

7.2 Performance standards for bridge watch alarms

NAV 46/7/4 - United Kingdom
NAV 46/7/5 - Germany

7.3 Performance standards for shipborne satellite Radionavigational receivers

NAV 46/7/6 - Sweden

7.4 User requirements for heading systems

NAV 46/7/2 - Japan

8 ITU matters, including Radiocommunications ITU-R Study Group 8 matters

(No documents submitted)

9 IMO Standard Marine Communication Phrases

NAV 46/9 - Germany
NAV 46/9/1 - Republic of Korea
NAV 46/INF.4 - Germany

10 Guidelines relating to SOLAS chapter V

10.1 Guidelines for recording events related to navigation

(No documents submitted)

10.2 Guidelines on Automatic Identification System (AIS) operational matters

NAV 46/10	-	ICS
NAV 46/10/1	-	IALA
MSC 72/10/8	-	INTERTANKO
MSC 72/10/12	-	ICS

11 Comprehensive review of chapter 13 of the HSC Code

(No documents submitted)

12 Development of guidelines for ships operating in ice-covered waters

(No documents submitted)

13 Work programme and agenda for NAV 47

(No documents submitted)

14 Election of Chairman and Vice-Chairman for 2001

(No documents submitted)

15 Any other business

NAV 46/15	-	Italy
NAV 46/15/1	-	United States
NAV 46/15/2	-	ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO
NAV 46/15/3	-	United Kingdom
NAV 46/15/4	-	IMPA
MSC 72/10/11	-	ICS
NAV 46/INF.5	-	ICS, BIMCO, INTERCARGO, INTERTANKO, IFSMA, ISF, OCIMF and SIGTTO
MSC 72/INF.9	-	Japan

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ANNEX 2

NEW AND AMENDED TRAFFIC SEPARATION SCHEMES AND ASSOCIATED ROUTEING MEASURES

LANDFALL AND APPROACHES TO TALARA BAY

(Reference charts: PERU-HIDRONAV-1126,1984 edition, Rev.1998; 1150,1999 edition
Note: these charts are based on the World Geodetic System (WGS 84) Datum)

Description of traffic separation scheme

The traffic separation scheme for the landfall and approaches to Talara Bay consists of the following:

(a) A separation zone bounded by a line connecting the following geographical points:

(1) 04º33'.10S; 08lº19'.13W
(2) 04º32'.90S; 081º22'.13W
(3) 04º33'.90S; 081º22'.13W
(4) 04º33'.70S; 081º19'.13W

(b) A traffic zone for westbound traffic, between the separation zone and a line connecting the following geographical points:

(5) 04º32'.40S; 081º19'.13W
(6) 04º31'.10S; 081º22'.13W

(c) A traffic zone for eastbound traffic, between the separation zone and a line connecting the following geographical points:

(7) 04º35'.70S: 081º22'.13W
(8) 04º34'.60S; 081º19'.13W

LANDFALL OFF PUERTO SALAVERRY

(Reference charts: PERU-HIDRONAV–1270, 1988 edition, Rev.1998; 2111, 1987 edition, Rev.1994
Note: these charts are based on the World Geodetic System (WGS 84) Datum.)

Description of traffic separation scheme

The traffic separation scheme for the landfall off Puerto Salaverry consists of the following:

(a) A separation zone bounded by a line connecting the following geographical points:

(1) 08º12'.65S; 079º02'.23W
(2) 08º12'.65S; 079º04'.63W

(3) 08º13'.30S; 079º04'.63W
(4) 08º13'.30S; 079º02'.23W

(b) A traffic lane for westbound traffic, between the separation zone and a line connecting the following geographical points:

(5) 08º11'.96S; 079º02'.23W
(6) 08º11'.10S; 079º04'.63W

(c) A traffic lane for eastbound traffic, between the separation zone and a line connecting the following geographical points:

(7) 08º14'.80S; 079º04'.63W
(8) 08º14'.00S; 079º02'.23W

LANDFALL AND APPROACHES TO FERROL BAY (PUERTO CHIMBOTE)

(Reference charts: PERU-HIDRONAV-1310, 1993 edition, Rev.1997; 2123, 1980 edition, Rev.1998
Note: these charts are based on the World Geodetic System (WGS 84) Datum.)

Description of traffic separation scheme

The traffic separation scheme for the landfall and approaches to Ferrol Bay (Puerto Chimbote) consists of the following:

(a) A separation zone bounded by a line connecting the following geographical points:

(1) 09º07'.20S; 078º37'.83W
(2) 09º07'.20S; 078º40'.33W
(3) 09º07'.80S; 078º40'.33W
(4) 09º07'.80S; 078º37'.83W

(b) A traffic lane for westbound traffic, between the separation zone and a line connecting the following geographical points:

(5) 09º06'.70S; 078º37'.83W
(6) 09º05'.80S; 078º40'.33W

(c) A traffic lane for eastbound traffic, between the separation zone and a line connecting the following geographical points:

(7) 09º09'.40S; 078º40'.33W
(8) 09º08'.40S; 078º37'.83W

LANDFALL AND APPROACHES TO SAN NICOLAS BAY

(Reference charts: PERU-HIDRONAV-312, 1999 edition; 3122, 1999 edition
Note: these charts are based on the World Geodetic System (WGS 84) Datum.)

Description of traffic separation scheme

The traffic separation scheme for the landfall and approaches to San Nicolas Bay consists of the following:

(a) A separation zone bounded by a line connecting the following geographical points:

(1) 15º13'.10S; 075º16'.13W
(2) 15º13'.10S; 075º18'.77W
(3) 15º13'.85S; 075º18'.77W
(4) 15º13'.85S; 075º16'.13W

(b) A traffic lane for westbound traffic, between the separation zone and a line connecting the following geographical points:

(5) 15º12'.54S; 075º16'.13W
(6) 15º11'.70S; 075º18'.77W

(c) A traffic zone for eastbound traffic, between the separation zone and a line between the following geographical points:

(7) 15º15'.40S; 075º18'.77W
(8) 15º14'.45S; 075º16'.13W

RIVER HUMBER ENTRANCE

(Reference charts: British Admiralty 1188, 1999 edition; 109, 1998 edition; 107, 1996 edition; 1190, 1997 edition.
Note: These charts are based on Ordnance Survey of Great Britain (1936) Datum.)

Description of the traffic separation scheme

Part I:
Entrance to River Humber within Port Area

(a) A precautionary area established by a line connecting the following geographical positions:

(1)	53° 34'.20N,	000° 06'.42E	
(2)	53° 33'.52N,	000° 05'.80E	
(3)	53° 33'.12N,	000° 06'.90E	(Hobo)
(4)	53° 33'.90N,	000° 07'.53E	(No.3A Binks)
(1)	53° 34'.20N,	000° 06'.42E	

(b) A separation line connecting the following geographical positions:

(5) 53° 33'.52N, 000° 07'.23E (Delta)
(6) 53° 32'.71N, 000° 09'.75E (Charlie)

(c) A traffic lane for inbound traffic established between the separation line specified in paragraph (b) above and straight line connecting the following geographical positions:

(4) 53° 33'.90N, 000° 07'.53E (No.3A Binks)
(7) 53° 33'.14N, 000° 10'.37E

(d) A traffic lane for outbound traffic established between the separation line specified in paragraph (b) above and straight line connecting the following geographical positions:

(3) 53° 33'.12N, 000° 06'.90E (Hobo)
(8) 53° 32'.32N, 000° 09'.21E (No.2B)

(e) A precautionary area established by a line connecting the following geographical positions:

(7) 53° 33'.14N, 000° 10'.37E
(8) 53° 32'.32N, 000° 09'.21E (No.2B)
(9) 53° 32'.36N, 000° 11'.22E
(10) 53° 33'.14N, 000° 11'.27E
(11) 53° 33'.05N, 000° 10'.73E (No.3 Chequer)
(7) 53° 33'.14N, 000° 10'.37E

(f) A traffic separation line connecting the following geographical positions:

(12) 53° 32'.65N, 000° 11'.25E (Bravo)
(13) 53° 32'.80N, 000° 13'.30E (Alpha)

(g) A traffic lane for inbound traffic established between the separation line specified in paragraph (f) above and straight line connecting the following geographical positions:

(10) 53° 33'.14N, 000° 11'.27E
(14) 53° 33'.50N, 000° 13'.90E

(h) A traffic lane for outbound traffic established between the separation line specified in paragraph (f) above and straight line connecting the following geographical positions:

(9) 53° 32'.36N, 000° 11'.22E
(15) 53° 32'.39N, 000° 12'.90E

Part II.
River Humber Approaches.

(i) A precautionary area established by a line connecting the following geographical positions:

(15)	53° 32'.39N,	000° 12'.90E	
(16)	53° 32'.40N	000° 13'.28E	(No.2 Haile Sand)
(17)	53° 30'.57N,	000° 16'.72E	
(18)	53° 31'.88N,	000° 18'.40E	(Hotspur)
(19)	53° 33'.55N,	000° 18'.40E	
(20)	53° 34'.20N,	000° 17'.70E	(South Haile)
(21)	53° 34'.72N,	000° 16'.65E	(South Binks)
(22)	53° 33'.54N,	000° 14'.30E	(Spurn Light Float)
(14)	53° 33'.50N,	000° 13'.90E	
(15)	53° 32'.39N,	000° 12'.90E	

Eastern Approaches (Sea Reach)

(j) A separation line connecting the following geographical positions:

(23)	53° 32'.70N	000° 18'.40E	(Inner Sea Reach)
(24)	53° 32'.70N	000° 23'.06E	(Outer Sea Reach)

(k) A traffic lane for inbound traffic established between the separation line specified in (j) above and a straight line connecting the following geographical positions:

(19)	53° 33'.55N,	000° 18'.40E	
(25)	53° 33'.55N,	000° 23'.06E	

(l) A traffic lane for outbound traffic established between the separation line specified in paragraph (j) above and straight line connecting the following geographical positions:

(18)	53° 31'.88N,	000° 18'.40E	(Hotspur)
(26)	53° 31'.88N,	000° 23'.06E	

Southeast Approaches (Rosse Reach)

(m) A separation line connecting the following geographical positions:

(27)	53° 31'.22N	000° 17'.55E	(Inner Rosse Reach)
(28)	53° 29'.87N	000° 20'.90E	(Outer Rosse Reach)

(n) A traffic lane for inbound traffic established between the separation line specified in paragraph (m) above and a straight line connecting the following geographical positions:

(18)	53° 31'.88N,	000° 18'.40E	(Hotspur)
(29)	53° 30'.54N,	000° 21'.68E	

(o) A traffic lane for outbound traffic established between the separation line specified in paragraph (m) above and straight line connecting the following geographical positions:

(17) 53° 30'.57N, 000° 16'.72E
(30) 53° 29'.17N, 000° 20'.08E

Northeast Approaches (New Sand Hole)

(p) A separation line connecting the following geographical positions:

(31) 53° 34'.46N 000° 17'.17E
(32) 53° 36'.97N 000° 20'.75E

(q) A traffic lane for inbound traffic established between the separation line specified in paragraph (p) above, and a straight line connecting the following geographical positions:

(21) 53° 34'.72N 000° 16'.65E (South Binks)
(33) 53° 37'.25N 000° 20'.20E (Outer Binks)

(r) A traffic lane for outbound traffic established between the separation line specified in paragraph (p) above, and a straight line connecting the following geographical positions:

(20) 53° 34'.20N 000° 17'.70E (South Haile)
(34) 53° 36'.70N 000° 21'.30E (Middle New Sand)

AMENDMENTS TO THE TRAFFIC SEPARATION SCHEME IN PRINCE WILLIAM SOUND

(Reference Chart: United States 16700, 26th Edition – 19 September 1998
Note: This chart is based on North American 1983 Geodetic Datum.)

Description of the Traffic Separation Scheme

The traffic separation scheme "In Prince William Sound" consists of two parts:

Part I:
Prince William Sound

(a) A separation zone is bounded by a line connecting the following geographic positions:

(1) 60º20'.77N	146º52'.31W
(2) 60º48'.12N	147º01'.78W
(3) 60º48'.29N	146º59'.77W
(4) 60º20'.93N	146º50'.32W

(b) A traffic lane for northbound traffic is established between the separation zone and a line connecting the following geographic positions:

(5) 60º20'.59N	146º48'.18W
(6) 60º49'.39N	146º58'.19W

(c) A traffic lane for southbound traffic is established between the separation zone and a line connecting the following geographic positions:

(7) 60º49'.10N	147º04'.19W
(8) 60º20'.60N	146º54'.31W

Part II:
Valdez Arm

(a) A separation zone is bounded by a line connecting the following geographic positions:

(9) 60º51'.08N	147º00'.33W
(10) 60º58'.60N	146º48'.10W
(11) 60º58'.30N	146º47'.10W
(12) 60º50'.45N	146º58'.75W

(b) A traffic lane for northbound traffic is established between the separation zone and a line connecting the following geographic positions:

(6) 60º49'.39N	146º58'.19W
(13) 60º58'.01N	146º46'.52W

(c) A traffic lane for southbound traffic is established between the separation zone and a line connecting the following geographic positions:

(14) 60º58'.93N	146º48'.86W
(15) 60º50'.61N	147º03'.60W

Precautionary areas

Cape Hinchinbrook: A precautionary area is established, bounded by a line connecting the following geographical positions:

(5) 60º20'.59N	146º48'.18W
(16) 60º12'.67N	146º40'.43W
(17) 60º11'.02N	146º28'.65W
(18) 60º05'.47N	146º00'.01W
(19) 60º00'.81N	146º03'.53W
(20) 60º05'.44N	146º27'.58W
(21) 59º51'.80N	146º37'.51W
(22) 59º53'.52N	146º46'.84W
(23) 60º07'.76N	146º36'.24W
(24) 60º11'.51N	146º46'.64W
(8) 60º20'.60N	146º54'.31W

Bligh Reef: A precautionary area of radius 1’.5 miles is centred upon geographical position:

60º49'.63N 147º01'.33W

Note:
A pilot boarding area is located near the centre of the Bligh Reef precautionary area. Due to heavy vessel traffic, mariners are advised not to anchor or linger in this precautionary area except to pick up or disembark a pilot.

***

ANNEX 3

DRAFT RESOLUTION MSC…(73)
(adopted on [.. December 2000])

MANDATORY SHIP REPORTING SYSTEM

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO regulation V/8-1 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 concerning the adoption by the Organization of ship reporting systems,

RECALLING FURTHER resolution A.858(20) which authorizes the Committee to perform the function of adopting ship reporting systems on behalf of the Organization,

TAKING INTO ACCOUNT the Guidelines and criteria for ship reporting systems adopted by resolution MSC.43(64),

HAVING CONSIDERED the recommendations of the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS, in accordance with SOLAS regulation V/8-1, the mandatory ship reporting system for the waters "Off Les Casquets and the adjacent coastal area", as described in the Annex to the present resolution;

2. DECIDES that the said mandatory ship reporting system will enter into force at 0000 hours UTC on [1 July 2001];

3. REQUESTS the Secretary-General to bring this resolution and its Annex to the attention of Member Governments and Contracting Governments to the SOLAS Convention.

ANNEX

DESCRIPTION OF THE MANDATORY SHIP REPORTING SYSTEM FOR THE WATERS OFF LES CASQUETS AND THE ADJACENT COASTAL AREA

1 CATEGORIES OF SHIPS WHICH WOULD BE REQUIRED TO PARTICIPATE IN THE MANCHEREP SYSTEM

The new system will apply to ships of over 300 GT, in line with the MAREP, OUESSREP and CALDOVREP systems already in place in the Channel or west of the Channel.

Within the coverage zone, these provisions replace the MAREP system in force for ships of 300 GT and over. However, ships of less than 300 GT will have to continue to make reports in accordance with the provisions of the voluntary system in the following circumstances:

- When they are not in control of their manoeuvres, or moored in the traffic separation scheme or the coastal area;

- When their capacity to manoeuvre is limited, or

- When their aids to navigation are defective.

Outside the zone, the provisions of the MAREP system remain unchanged.

2 GEOGRAPHICAL COVERAGE OF THE SYSTEM AND NUMBER AND EDITION OF THE REFERENCE CHART USED FOR THE DELINEATION OF THE SYSTEM

The reporting system would cover the TSS of Les Casquets and the adjacent coastal navigation area.

Thus, the area covered would be bounded by a line connecting the following four points:

A: 50º10'.0 N / 002º58'.0 W
B: 50º10'.0 N / 002º00'.0 W
C: 49º20'.0 N / 002º00'.0 W
D: 49º20'.0 N / 002º58'.0 W

The call should be made 2 nautical miles before entering the area (chart annexed).

Traffic crossing on regular routes

Ships making regular voyages from a port situated within the coverage area or in an adjacent area must send their reports to Jobourg. However, since ferries generally sail in accordance with fixed schedules, it will be possible for arrangements to be made on a case-by-case basis between ships and the Jobourg VTS.

Reference chart

The marine reference chart including all the area covered by the proposed system is French chart No.7311 of the Naval Hydrographical and Oceanographic Service (International chart no.1071).

3 FORMAT AND CONTENT OF REPORTS, AUTHORITY TO WHICH REPORTS SHOULD BE SENT, SERVICES AVAILABLE

The MANCHEREP reports required of ships entering the area covered by the system would be position reports of the OUESSREP and CALDOVREP type which are sent to the VTS by ships identifying themselves in the traffic separation schemes of Ouessant and the Pas de Calais.

A ship may elect, for reasons of commercial confidentiality, to communicate that section of the report which provides information on cargo by non-verbal means prior to entering the system.

The requirements listed below are taken from the standard reporting format set out in paragraph 2 of the appendix to resolution A.851(20).

3.1 Content

The report required should include:

.1 information considered to be essential:

- name of ship, call sign or IMO number (A)
- position (C or D)
- course and speed (E and F)

When they receive a position report message, the VTS operators do their best to correlate the position of the ship with the information available to them:

- echo radar at position indicated
- direction finding data
- description of the environment given by the officer of the watch
- position in relation to other ships (in case of dense traffic)
- course and speed.

Information on course and speed is thus an additional element enabling the VTS operators to correlate the announced position and if necessary to pick a ship out from within a group.

In addition, in accordance with the provisions of the SOLAS and MARPOL conventions, ships will be required to give information on any defects, damage, deficiencies or other limitations, as well as, if appropriate, information on pollution or cargo losses.

3.2 Recipient of report

The shore-based authority for the whole area is the Jobourg Vessel Traffic Service (VTS) (call sign 'Jobourg Trafic') operating from the premises of the Regional Operational Centre for Surveillance and Rescue (CROSS JOBOURG). This is a service of the Ministry of Equipment, Transport and Housing which is similar to the MRCC and the VTS

The VTS broadcasts a regular information bulletin on ship traffic at 20 minutes and 50 minutes past the hour. This bulletin indicates:

- information on traffic
- urgent warnings to mariners concerning the area
- special weather bulletins

This information is broadcast in French and English on VHF channel 80 following a call on VHF channel 16.

The VTS also broadcasts regular weather reports in French (07h00, 15h00 and 19h00 French time) and special reports in French and English at 3 minutes past the hour from coastal transmitters situated at Granville, Jobourg, Port en Bessin and Antifer.

In addition, if required, the VTS can provide personalized information on a ship, notably as an aid to positioning.

4 INFORMATION TO BE COMMUNICATED TO SHIPS AND PROCEDURES TO BE FOLLOWED

Ships detected and identified are tracked on radar. This tracking in no way exempts masters from their navigational responsibilities.

They are informed about traffic conditions in the traffic separation scheme, about the beaconing situation and about weather conditions; on request, they can receive personalized assistance.

The Channel vessel traffic services keep each other informed of transits by ships, particularly ships carrying hazardous cargoes.

5 COMMUNICATION REQUIREMENTS FOR THE SYSTEM, INCLUDING FREQUENCIES ON WHICH REPORTS SHOULD BE TRANSMITTED AND INFORMATION TO BE REPORTED

The proposed communication requirements for the system are those defined for area A1 in the framework of the GMDSS.

Ship reporting is effected by radiotelephony on metric waves. The channels selected are VHF channel 13, on which there is continuous watch by the VTS, and channel 80, which is also used for broadcasting safety information.

The above-mentioned frequency plan would be used pending the modifications made necessary by the use of AIS transponders, which can also be used for transmitting reports. France will be sending a communication to IMO on the subject of the possibility of such transmissions.

If for any reason a ship finds it impossible to communicate with the VTS by VHF, it should use any other means of communication it may have available.

6 RELEVANT RULES AND REGULATIONS IN FORCE IN THE AREA OF THE PROPOSED SYSTEM

The International Regulations for Preventing Collisions at Sea (COLREGs) apply throughout the area covered by the proposed system.

Since the traffic separation scheme of Les Casquets is approved by IMO, regulation 10 applies therein.

Ships carrying dangerous goods coming from or bound for a port within the reporting zone must comply with the European Community directive HAZMAT (EC Directive 93/75).

In addition to these international regulations, the joint order issued by the Maritime Prefect for the Atlantic and the Maritime Prefect for the Channel and North Sea (No. 92/97 Brest, No.03/97 Cherbourg) regulates shipping in the approaches to the French North Sea, Channel and Atlantic coasts with a view to preventing accidental marine pollution.

These regulations provide, in particular, that ships carrying oil (MARPOL 73 Annex I), dangerous liquid substances (MARPOL Annex II), noxious substances (MARPOL Annex III) or dangerous goods (IMDG Code) which are intending to pass through or to stay in French territorial waters, must give advance warning by sending a message to the appropriate CROSS five hours before entering those territorial waters, or six hours before setting sail.

The message sent to CROSS must indicate what movements the ship plans to make in territorial waters and the condition of its manoeuvring and navigational capabilities.

The same regulations require a watch to be kept on channel 16 VHF or other specific frequencies in certain areas, and also require that notification be given of any accident occurring less than 50 miles from the French coast and that the necessary measures be taken by the maritime authorities to reduce risks.

The United Kingdom has established a pollution control area under the Merchant Shipping (Prevention of Pollution) (Limits) Regulations, 1996. The reporting zone comes partially within these limits. Polluting ships within the zone may be prosecuted and sentenced to a heavy fine.

7 SHORE-BASED FACILITIES AND PERSONNEL QUALIFICATIONS AND TRAINING REQUIRED TO SUPPORT THE OPERATION OF THE PROPOSED SYSTEM

7.1 Shore-based facilities

The JOBOURG Vessel Traffic Service operates from the premises of the JOBOURG Regional Operational Centre for Surveillance and Rescue. This service has both radar and radio facilities.

7.2 Radar facilities

A radar monitoring system of the THOMSON TRS 3405 type is installed at the Jobourg centre. This facility has two transmitters/receivers. The main antenna is situated 202 metres above zero on the charts. An emergency radar facility of the THOMSON TRS 3410 type is also in service. The nominal range of the radar is 64 miles. The centre is manned by technical staff around the clock.

The radar data are processed and then interpreted by the personnel on duty. Watch is maintained on display consoles.

The echo of every ship detected in the area of coverage is noted as an automatically referenced radar track. Any additional information is keyed in by the operators for each track identified. The vessel traffic service is equipped with a system for processing and filing radar data which permits the publication of statistics and trajectography.

7.3 Radiocommunication facilities

The personnel on watch duty use radio facilities installed at the JOBOURG centre. The vessel traffic service has four dedicated transmitter/receivers for its exclusive use.

In addition, the VTS can if necessary make occasional use of the VHF radio facilities of the MRCC. These are both local and off-site VHF facilities.

The VTS is also equipped with MHF facilities and with aeronautical VHF, which enables it to establish contact with aircraft carrying out monitoring missions.

The operators of the vessel traffic service use direction finders which are accurate to within one half of a degree. One of these is installed at Jobourg and the other at the Roches Douvres lighthouse. On each of these direction finders it is possible to select two different channels simultaneously.

7.4 Information exchange

Lastly, a database shared by all three Channel vessel traffic services makes it possible to exchange information on ships identified, so that procedures for contacts between the VTS and the ships can be simplified.

8 ALTERNATIVE COMMUNICATION IF THE COMMUNICATION FACILITIES OF THE SHORE-BASED AUTHORITY FAIL

The VHF radiocommunication facilities of the vessel traffic service are installed in Jobourg. They consist of four single channel transmitter/receivers and one emergency multi-channel transmitter/receiver. One multi-channel transmitter/receiver normally dedicated to the Jobourg MRCC supplements the VTS facilities.

Failure of several of the VHF radio facilities of the VTS would not eliminate all possibility of contact between the VTS and ships. There is thus no need to make provision for any special procedure in such a case.

If need should arise for an MF link in the event of failure of the facilities at the Jobourg centre, a call would be made to the Ouessant VTS coastal radio station.

In the event of simultaneous breakdown of both radar monitoring facilities, the harbour master's office of Aurigny Island would take over the vessel traffic service of Les Casquets until such time as repairs had been completed.

ANNEX

OBJECTIVES AND DEMONSTRATED NEED FOR THE SHIP REPORTING SYSTEM IN THE AREA OFF LES CASQUETS

The proposed system will be used by the Jobourg vessel traffic service (VTS), which since 1983 has been monitoring shipping in the traffic separation scheme (TSS) of Les Casquets and the surrounding area. It will supplement the systems already in place at Ouessant and in the Pas de Calais and thus strengthen the general monitoring and prevention arrangements in the Channel.

The new system should make possible a significant increase in safety, efficiency of navigation and environmental protection in and around the TSS of Les Casquets. In fact, mandatory reporting should avoid the hazardous situations which can be caused by unidentified ships which adopt erratic or even dangerous routes, stop in a traffic lane after sustaining damage, or behave in a manner which could give rise to confusion in the absence of information.

Out of a daily traffic of some 300 ships the identification rate is currently slightly above 40%. The setting up of a mandatory reporting system will enable this rate to be increased significantly, in an area where the inability to exchange information can lead to dangerous situations.

Mandatory reporting will enable VTS operators to confirm the position of the ship, carry out effective radar tracking, and enter into communication with the ship in order to give it any information that may be necessary for its own safety. The number of violations of safety regulations could be substantially reduced by better prevention. It will be noted that half the violations recorded are committed by ships with which the VTS is unable to enter into contact despite repeated calls.

The marine environment will benefit, as a consequence, from enhanced protection. The risks of running aground due to navigational error or to damage sustained by a ship carrying dangerous cargo will be greatly reduced.

In addition the efficiency of the Jobourg MRCC associated with the VTS will be improved. It will be able to establish the situation of vessels in the area much more rapidly should the need arise for a search and rescue operation.

***

ANNEX 4

DRAFT AMENDMENTS TO THE GENERAL PROVISIONS ON SHIPS' ROUTEING (RESOLUTION A.572(14), AS AMENDED)

Amend the General Provisions on Ships' Routeing, (resolution A.572(14), as amended), as follows:

Section 1

1 Paragraph 1.1. In the last part of the paragraph where it says "or grounding in or near environmentally sensitive areas.", amend to " **, grounding or anchoring in or near environmentally sensitive areas.**"

Section 2

1 Paragraph 2.1.1. Add the words "**no anchoring areas**" between "areas to be avoided" and "inshore traffic zones"; and

2 Renumber existing paragraphs 2.1.14 and 2.1.15 to 2.1.15 and 2.1.16 and add a new paragraph 2.1.14 as follows:

2.1.14 No anchoring area

A routeing measure comprising an area within defined limits where anchoring is hazardous or could result in unacceptable damage to the marine environment. Anchoring in a no anchoring area should be avoided by all ships or certain classes of ships, except in case of immediate danger to the ship or the persons on board.

Section 3

1 Paragraph 3.1. Add the words "**or types and quantities of bunker fuel**" after the last word "cargoes"; and

2 Paragraph 3.11.4. Add the words "**or types and quantities of bunker fuel**" between "cargoes" and "of a routeing".

Section 4

1 Add a new paragraph 4.6.4 as follows:

.4 ***No anchoring areas*** (figure 19);

2 After Figure 18 insert Figure 19, as given below:

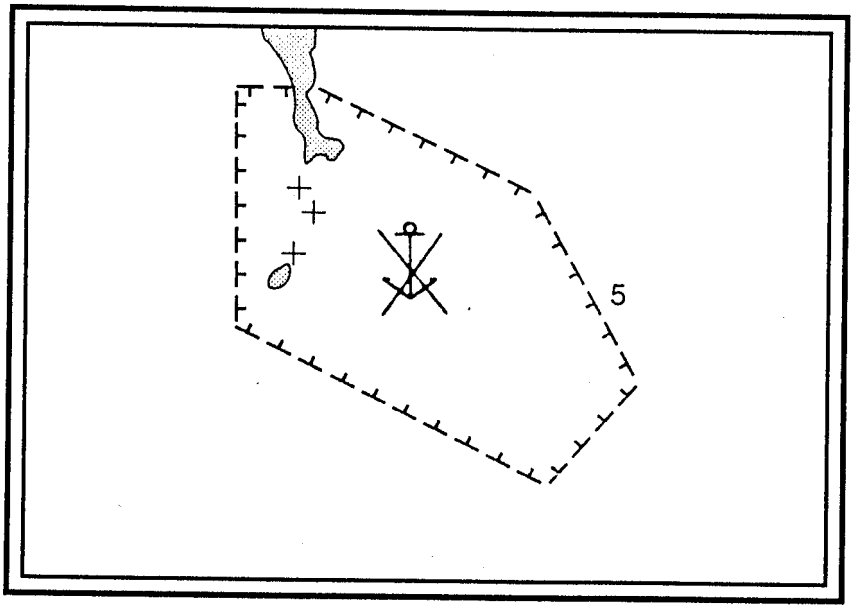

Figure 19 - ***No anchoring area***

Section 5

1 Renumber existing paragraphs 5.6 to 5.7 and add a new paragraph 5.6 as follows:

When establishing a no anchoring area for all ships or certain classes of ships, the necessity for creating such an area should be well demonstrated and the reasons stated. In general, these areas should be established only in areas where anchoring is hazardous, or where there is a possibility that unacceptable damage to the marine environment could result. The classes of ships which should avoid anchoring in an area should be considered and clearly identified in each particular case.

Section 8

1 Paragraph 8.1. Add the words "**or types and quantities of bunker fuel**" after the last word "cargoes".

Section 9

1 In paragraph 9.2, under the heading of "Legend", add "**No anchoring areas**" and under the heading of "Use of Legend", add "**Shown on charts and referred to in notes.**";

2 Table in paragraph 9.3, in row "5 Limits of restricted areas", column "Applications", add the words "**no anchoring areas**" between "avoided" and "and ends";

3 Under the heading Notes in paragraph 9.3, in the last sentence, replace "figures 1 to 18" by **"figures 1 to 19"**;

4 Paragraph 9.4.16. Add '**No anchoring area**" on the right side of "Area to be avoided"; and

5 Add the following new paragraph 9.5.4 after paragraph 9.5.3:

"**9.5.4** ***No anchoring areas***

Notes on conditions governing no anchoring areas (classes and sizes of ships, etc,) should preferably be given on charts and should always be given in *Sailing Directions*."

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ANNEX 5

DRAFT RESOLUTION MSC…(73)
adopted on [……2000]

GUIDELINES AND CRITERIA FOR SHIP REPORTING SYSTEMS

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

HAVING CONSIDERED, at its [seventy-third] session, the recommendation of the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the amendments to section 3 of the Guidelines and Criteria for Ship Reporting Systems (resolution MSC.43(64)), set out in the Annex to the present resolution;

2. DETERMINES that the amendments to the Guidelines and Criteria for Ship Reporting Systems (resolution MSC.43(64)) shall enter into force on [1 July 2001];

3. INVITES Governments developing ship reporting systems for adoption by the Organization in accordance with SOLAS regulation V/8-1 to take account of the amendments set out in the Annex to the present resolution;

4. REQUESTS the Secretary-General to bring this resolution to the attention of all Contracting Governments to the SOLAS Convention and to Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

AMENDMENTS TO GUIDELINES AND CRITERIA FOR SHIP REPORTING SYSTEMS (RESOLUTION MSC.43(64))

Section 3 - Criteria for planning, proposing and implementing adopted ship reporting systems by Contracting Governments

3.2 Add the words "**or revising**" between "Planning" and "ship reporting".

3.2.2 Add the words "**or revising**" between "In planning" and "a system".

3.2.2.2 Add the words "**or types and quantities of bunker fuel**" after the last word "cargoes".

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ANNEX 6

ROUTEING MEASURES OTHER THAN TRAFFIC SEPARATION SCHEMES

MANDATORY NO ANCHORING AREAS FOR ALL SHIPS ON FLOWER GARDEN BANKS CORAL REEFS

EAST FLOWER GARDEN BANK

(Reference chart: United States 11340, 65th edition, 5 February 2000.
Note*:* This chart is based on North American 1983 Geodetic Datum.)

Point Number	Latitude (N)	Longitude (W)
E-1	27º52'.91	093º37'.70
E-2	27º53'.60	093º38'.40
E-3	27º55'.24	093º38'.68
E-4	27º57'.53	093º38'.56
E-5	27º58'.48	093º37'.78
E-6	27º59'.04	093º35'.54
E-7	27º59'.03	093º35'.17
E-8	27º55'.39	093º34'.26
E-9	27º54'.08	093º34'.32
E-10	27º53'.46	093º35'.09
E-11	27º52'.88	093º36'.96

WEST FLOWER GARDEN BANK

(Reference chart: United States 11340, 65th edition, 5 February 2000.
Note*:* This chart is based on North American 1983 Geodetic Datum.)

Point Number	Latitude (N)	Longitude (W)
W-1	27º49'.19	093º50'.76
W-2	27º50'.22	093º52'.18
W-3	27º51'.23	093º52'.87
W-4	27º51'.56	093º52'.85
W-5	27º52'.85	093º52'.42
W-6	27º55'.03	093º49'.74
W-7	27º54'.99	093º48'.64
W-8	27º54'.60	093º47'.18
W-9	27º54'.26	093º46'.83
W-10	27º53'.61	093º46'.86
W-11	27º52'.97	093º47'.26
W-12	27º50'.69	093º47'.38
W-13	27º49'.20	093º48'.72

STETSON BANK

(Reference chart: United States 11300, 35th edition, 31 July 1990; 11330, 12th edition. 8 August 1998; 11340, 65th edition, 5 February 2000.
Note: These charts are based on North American 1983 Geodetic Datum.)

Point Number	Latitude (N)	Longitude (W)
S-1	28º 09'.52	094º 18'.53
S-2	28º 10'.17	094º 18'.50
S-3	28º 10'.13	094º 17'.40
S-4	28º 09'.48	094º 17'.43

***

ANNEX 7

DRAFT ASSEMBLY RESOLUTION ON AMENDMENTS TO THE INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA, 1972

THE ASSEMBLY,

RECALLING article VI of the Convention on the International Regulations for Preventing Collisions at Sea, 1972, on amendments to the Regulations,

HAVING CONSIDERED the amendments to the International Regulations for Preventing Collisions at Sea, 1972, adopted by the Maritime Safety Committee at its [seventy-third] session and communicated to all Contracting Parties in accordance with paragraph 2 of article VI of that Convention and also the recommendations of the Maritime Safety Committee concerning entry into force of these amendments,

1. ADOPTS, in accordance with paragraph 3 of article VI of the Convention, the amendments set out in the Annex to the present resolution;

2. DECIDES, in accordance with paragraph 4 of article VI of the Convention, that the amendments shall enter into force on [.. November 2003] unless by [... May 2002] more than one third of the Contracting Parties have notified their objection to the amendments;

3. REQUESTS the Secretary-General, in conformity with paragraph 3 of article VI, to communicate this resolution to all Contracting Parties to the Convention for acceptance.

4. INVITES Contracting Parties to notify any objections to the amendments not later than [... May 2002], whereafter the amendments will be deemed to have been accepted to enter into force as determined in the present resolution.

ANNEX

AMENDMENTS TO THE INTERNATIONAL REGULATIONS FOR PREVENTING COLLISIONS AT SEA, 1972

1 Rule 3

- Amend paragraph (a) as follows:

(a) The word "vessel" includes every description of water craft, including non-displacement craft, **WIG craft** and seaplanes, used or capable of being used as a means of transportation on water.

- Add a new paragraph (m) as follows:

(m) **The term "Wing-In-Ground (WIG) craft" means a multimodal craft which, in its main operational mode, flies in close proximity to the surface by utilizing surface-effect action.**

2 Rule 8

- Amend paragraph (a) as follows:

(a) Any action to avoid collision shall **be taken in accordance with the rules of this Part and**, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.

3 Rule 18

- Add a new paragraph (f) as follows:

(f) (i) **A WIG craft when taking-off, landing and in flight near the surface shall keep well clear of all other vessels and avoid impeding their navigation;**

(ii) **a WIG craft operating on the water surface shall comply with the Rules of this Part as a power-driven vessel.**

4 Rule 23

- Add a new paragraph (c) as follows:

(c) **A WIG craft only when taking-off, landing and in flight near the surface shall, in addition to the lights prescribed in paragraph (a) of this Rule, exhibit a high intensity all-round flashing red light.**

Bold: proposed additions/changes
~~Strikeout~~: proposed deletions

5 Rule 31

- Amend Rule 31 as follows:

Where it is impracticable for a seaplane **or a WIG craft** to exhibit lights and shapes of the characteristics or in the positions prescribed in the Rules of this Part she shall exhibit lights and shapes as closely similar in characteristics and position as is possible.

6 Rule 33

- Amend Rule 33 (a) as follows:

(a) A vessel of 12 metres or more in length shall be provided with a whistle ~~and a bell~~**, a vessel of 20 metres or more in length shall be provided with a bell in addition to a whistle**, and a vessel of 100 metres or more in length shall, in addition, be provided with a gong, the tone and sound of which cannot be confused with that of the bell. The whistle, bell and gong shall comply with the specification in Annex III to these Regulations. The bell or gong or both may be replaced by other equipment having the same respective sound characteristics, provided that manual sounding of the required signals shall always be possible.

7 Rule 35

- Add a new paragraph (i) and renumber accordingly:

(i) **A vessel of 12 metres or more but less than 20 metres in length shall not be obliged to give the bell signals prescribed in paragraphs (g) and (h) of this Rule. However, if she does not, she shall make some other efficient sound signal at intervals of not more than 2 minutes.**

8 ANNEX I

Section 13 High-speed craft

- Amend the existing text of this section as follows:

(a) The masthead light of high-speed craft ~~with a length to breadth ratio of less than 3.0~~ may be placed at a height related to the breadth of the craft lower than that prescribed in paragraph 2(a)(i) of this annex, provided that the base angle of the isosceles triangles formed by the sidelights and masthead light, when seen in end elevation, is not less than 27º.

(b) **On high-speed craft of 50 metres or more in length, the vertical separation between fore mast and main mast light of 4.5 metres required by paragraph 2(a)(ii) of this annex may be modified provided that such distance shall not be less than the value determined by the following formula:**

$$y = \frac{(a + 17Y)C}{1000} + 2$$

where y is the height of the main mast light above the fore mast light in metres;
a is the height of the fore mast light above the water surface in service condition in metres;
Y is the trim in service condition in degrees;
C is the horizontal separation of masthead lights in metres.

9 ANNEX III

Section 1 Whistles

- Amend paragraph (a):

(a) *Frequencies and range of audibility*

The fundamental frequency of the signal shall lie within the range 70-700Hz. The range of audibility of the signal from a whistle shall be determined by those frequencies, which may include the fundamental and/or one or more higher frequencies, which lie within the range 180-700Hz (+/-1 per cent) **for a vessel of 20 metres or more in length, or 180-2100Hz (+/-1 per cent) for a vessel of less than 20 metres in length** and which provide the sound pressure levels specified in paragraph 1(c) below.

- Amend paragraph (c):

(c) *Sound signal intensity and range of audibility*

A whistle fitted in a vessel shall be provided, in the direction of maximum intensity of the whistle and at a distance of 1 metre from it, a sound pressure level in at least one 1/3rd-octave band within the range of frequencies 180-700Hz (+/-1 per cent) **for a vessel of 20 metres or more in length, or 180-2100Hz (+/-1 per cent) for a vessel of less than 20 metres in length**, of not less than the appropriate figure given in the table below.

Length of vessel in metres	1/3rd-octave band level at 1 metre in dB referred to $2x10^{-5}N/m^2$	Audibility range in nautical miles
200 or more	143	2
75 but less than 200	138	1.5
20 but less than 75	130	1
Less than 20	120***1**	0.5
	115*2	
	111*3	

***1 When the measured frequencies lie within the range 180-450Hz**
***2 When the measured frequencies lie within the range 450-800Hz**
***3 When the measure frequencies lie within the range 800-2100Hz**

Section 2 Bell or gong

- Amend paragraph (b) as follows:

(b) *Construction*

Bells and gongs shall be made of corrosion-resistant material and designed to give a clear tone. The diameter of the mouth of the bell shall be not less than 300 mm for vessels of 20 metres or more in length. ~~and shall be not less than 200 mm for vessels of 12 metres or more but of less than 20 metres in length.~~ Where practicable, a power-driven bell striker is recommended to ensure constant force but manual operation shall be possible. The mass of the striker shall be not less than 3 per cent of the mass of the bell.

***

ANNEX 8

DRAFT MSC CIRCULAR

GUIDELINES ON ERGONOMIC CRITERIA FOR BRIDGE EQUIPMENT AND LAYOUT

1 The Maritime Safety Committee, [at its seventy-third session (27 November to 6 December 2000)], adopted the annexed Guidelines on Ergonomic Criteria for Bridge Equipment and Layout which have been developed to assist designers in realising a sufficient ergonomic design of the bridge, with the objective of improving the reliability and efficiency of navigation.

2 These Guidelines have been prepared to support provisions of regulation V/15 of the SOLAS Convention – Principles relating to bridge design, design and arrangement of navigational systems and equipment and bridge procedures.

3 Member Governments are invited to bring these Guidelines to the attention of all parties concerned.

ANNEX

Guidelines on Ergonomic Criteria for Bridge Equipment and Layout

Contents

1 Scope

The Guidelines are developed to realize a successful ergonomic design of the bridge and the equipment on the bridge, which will improve the reliability and efficiency of navigation. These Guidelines therefore contain ergonomic requirements as well as a functionally oriented bridge layout to support watch-keeping personnel in his tasks by a user-centred design of the bridge equipment and layout.

2 Purpose

The purpose of these Guidelines is to provide ergonomic requirements for the bridge equipment and layout to render assistance to consistent, reliable and efficient bridge operation.

3 Application

These Guidelines are intended to apply to new ships.

4 Description of the Workstations on the Bridge

Workstation for navigating and manoeuvring:
Main workstation for ship's handling conceived for working in seated/standing position with optimum visibility and integrated presentation of information and operating equipment to control and consider ship's movement. It should be possible from this place to operate the ship safely, in particular when a fast sequence of actions is required.

Workstation for monitoring:
Workstation from which operating equipment and surrounding environment can be permanently observed in seated / standing position; when several crew members are working on the bridge it serves for relieving the navigator at the workstation for navigating and manoeuvring and/or for carrying out control and advisory functions by master and/or pilot.

Workstation for manual steering (Helmsman's workstation):
Workstation from which the ship can be steered by a helmsman as far as legally or otherwise required or deemed to be necessary, preferably conceived for working in seated position.

Workstation for docking (bridge wing):
The workstation for docking operations on the bridge wing should enable the navigator together with a pilot (when present) to observe all relevant external and internal information and control the manoeuvring of the ship.

Workstation for planning and documentation:
Workstation at which ship’s operations are planned (e.g. route planning, deck log). Fixing and documenting all facts of ship's operation.

Workstation for safety:
Workstation at which monitoring displays and operating elements or systems serving safety are co-located.

Workstation for communication:
Workstation for operation and control of equipment for distress and safety communications (GMDSS) and general communications.

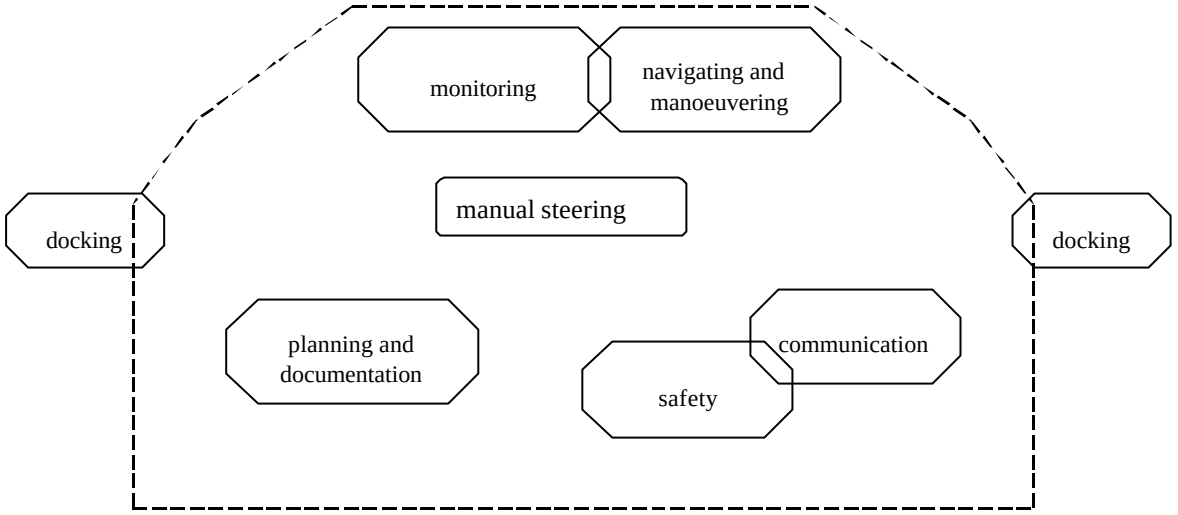


Fig. 1: Example of function areas – showing a possible location of workstations

In APPENDIX 2 the recommended equipment for the various workstations is listed.

Ergonomic Requirements

5.1 Bridge Layout

5.1.1 Sight

5.1.1.1 Field of Vision

5.1.1.1.1 Minimum Field of Vision

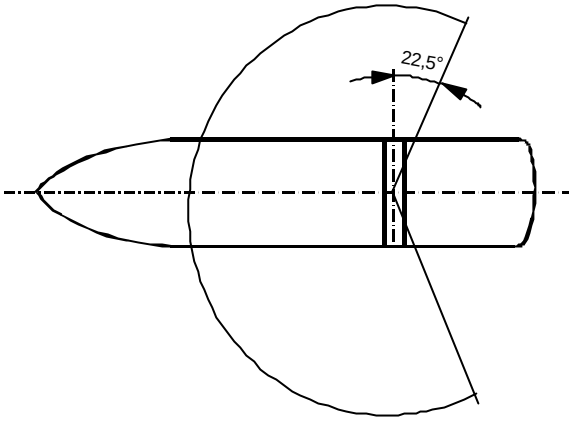
The view of the sea surface from the navigating and manoeuvring workstation should not be obscured by more than two ship lengths or 500 m, whichever is less, forward of the bow to 10° on either side under all conditions of draught, trim and deck cargo.

5.1.1.1.2 Field of Vision around the Ship

There should be a field of vision around the vessel of 360° obtained by an observer moving within the confines of the wheelhouse.

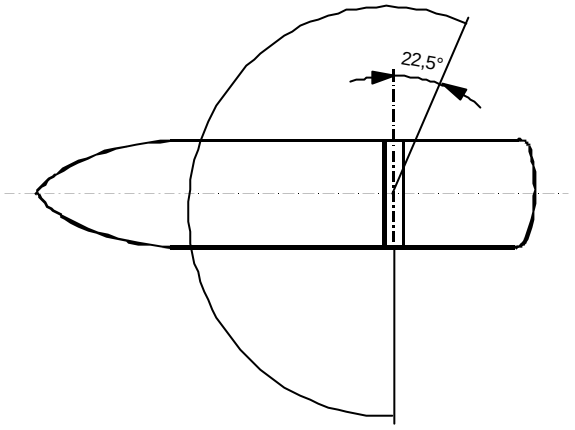
5.1.1.1.3 Navigating and Manoeuvring Workstation

The horizontal field of vision from the navigating and manoeuvring workstation should extend over an arc of not less than 225°, that is from right ahead to not less than 22.5°, abaft the beam on either side of the ship.



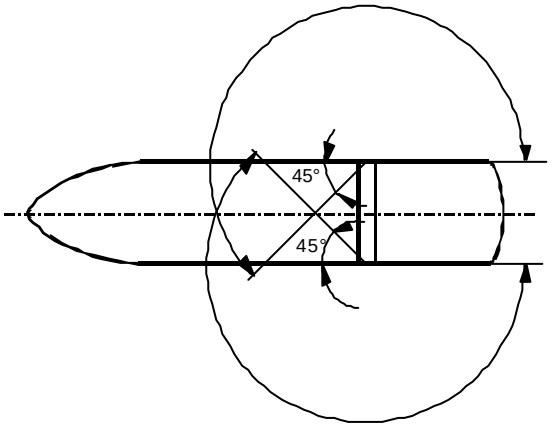
5.1.1.1.4 Monitoring Workstation

From the monitoring workstation, the field of vision should extend at least over an arc from 90° on the port bow, through forward, to 22.5° abaft the beam on starboard.



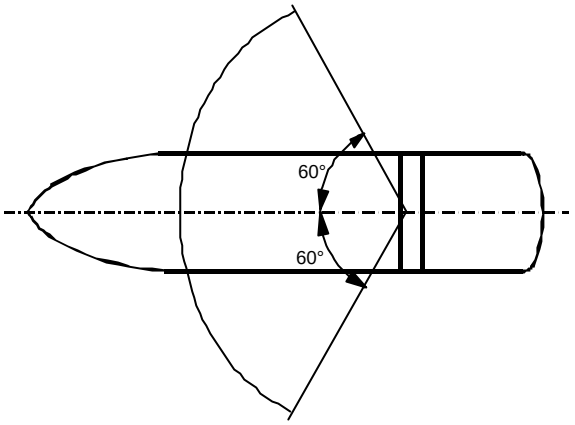
5.1.1.1.5 Bridge Wing

From each bridge wing the horizontal field of vision should extend over an arc at least 225°, that is at least 45° on the opposite bow through right ahead and then from right ahead to right astern through 180° on the same side of the ship.



5.1.1.1.6 Main Steering Position

From the main steering position (workstation for manual steering) the horizontal field of vision should extend over an arc from right ahead to at least 60° on each side of the ship.



5.1.1.1.7 Blind Sectors

The safe look-out from the navigating and manoeuvring workstation should not be influenced by blind sectors.

No blind sector caused by cargo, cargo gear or other obstructions outside of the wheelhouse forward of the beam which obstructs the view of the sea surface as seen from the navigating and manoeuvring workstation, should exceed 10°. The total arc of blind sectors should not exceed 20°. The clear sector between two blind sectors should be at least 5°. Over an arc from right ahead to at least 10° on each side, each individual blind sector should not exceed 5°.

5.1.1.1.8 View of the Ship's Side

The ship’s side should be visible from the bridge wing. Bridge wings should be provided out to the maximum beam of the ship. The view over the ship’s side should not be obstructed.

5.1.1.2 Windows

5.1.1.2.1 Lower Edge of the Front Window

The height of the lower edge of the front windows should allow a forward view over the bow for a person in a sitting position at the workstation for navigating and manoeuvring and the workstation for monitoring.

Within the required field of vision the height of the lower edge of the windows above the bridge deck should be kept as low as possible. In no case should the lower edge present an obstruction to the forward view as described in 5.1.1.1.

5.1.1.2.2 Upper Edge of the Front Window

The upper edge of the front windows should allow a forward view of the horizon for a person in a standing position with an eye height of 1.800 mm above the bridge deck at the navigating and manoeuvring workstation, when the ship is pitching in heavy seas. If 1.800 mm eye height is unreasonable and impractical, the eye height may be reduced, but not less than 1.600 mm.

5.1.1.2.3 Framing Between Windows

Framing between windows should be kept to a minimum and not be installed immediately forward of any workstation, or the centre-line. If stiffeners between windows are to be covered, this should not cause further obstructions of the field of view from any position inside the wheelhouse.

5.1.1.2.4 Front Window Inclination

To help avoid reflections, the bridge front windows should be inclined from the vertical plane top out, at an angle of not less than 10° and not more than 25°.

5.1.1.2.5 Rear and Side Window Inclination

To help avoid reflections, rear and side windows should be inclined from the vertical plane top out, at an angle of not less than 10° and not more than 25°. Exceptions can be made for windows in bridge wing doors.

5.1.1.2.6 Removable Sunscreens

To ensure a clear view and to avoid reflections in bright sunshine, sunscreens with minimum colour distortion should be provided at all windows. Such screens should be readily removable and not permanently installed.

5.1.1.2.7 Glass Characteristics

Polarized and tinted windows should not be fitted.

5.1.1.2.8 Clear View

A clear view through at least two of the bridge windows and, depending on the bridge configuration, an additional number of windows with a clear view should be provided at all times, regardless of the weather conditions.

5.1.2 Arrangement

5.1.2.1 Wheelhouse Dimensions

The clear ceiling height in the wheelhouse should be designed with regard to the installation of overhead panels and devices. The clear height between the bridge deck surface covering and the underside of the deck head beams should be at least 2.25 m. The lower edge of deckhead mounted equipment should be at least 2.1 m above the deck in open areas, passageways and at standing workstations.

5.1.2.2 View of the area in front of the bridge superstructure

It should be possible to watch the area in front of the bridge superstructure from the wheelhouse.

5.1.2.2.1 Position close to the Forward Centre Window

A position should be provided close to the forward centre window.

If the view in the centre-line is obstructed by large masts, cranes, etc., two additional positions giving a clear view ahead should be provided, one on the port side and one on the starboard side of the centre-line, no more than 5 m apart.

5.1.2.2.2 Access to Front Window

A second close approach access besides the position should be possible or the width of the position should be sufficient to accommodate two persons.

5.1.2.3 Position of the Workstation for Navigating and Manoeuvring

The workstation for navigating and manoeuvring should be laid out if practicable, at the starboard side close to the centre-line.

5.1.2.4 Position of the Workstation for Manual Steering

The workstation for manual steering should preferably be located on the ship's centre-line. If the view ahead is obstructed by large masts, cranes, etc., the steering station should be located a distance to starboard of the centre-line, sufficient to obtain a clear view ahead. If the workstation for manual steering is located off the centre-line, special steering references for use by day and night should be provided, e.g. sighting marks forward.

5.1.2.5 Position of the Workstation for Monitoring

The workstation for monitoring should be laid out if practicable, at the port side close to the centre-line.

5.1.2.6 Bridge Wing Communication

An internal communication system between the workstation for docking and the workstation for navigating and manoeuvring should be provided when the distance between the workstations is greater than 10 m. An internal communication system should always be provided between the workstation for navigating and manoeuvring and open bridge wings. Where workstations are widely spread, internal communication systems should be provided so that unhampered communications can be achieved under all operating conditions. It is important that all order/action communication systems be two-way.

5.1.2.7 Doors

All wheelhouse doors should be operable with one hand. Bridge wing doors should not be self-closing. Means should be provided to hold bridge wing doors open.

5.1.2.8 Portable Items

Portable items, such as safety equipment, tools, lights, pencils, should be stored at appropriate places, specially designed wherever necessary.

5.1.3 Accessibility and Movement

5.1.3.1 Clear Route

A clear route across the wheelhouse from bridge wing to bridge wing should be provided. The width of the passageway should be at least 1 200 mm.

5.1.3.2 Adjacent Workstation Distances

The distance between adjacent workstations should be sufficient to allow unobstructed passage to persons not working at the stations.

The free passage in passageways between different workstation areas should be at least 700 mm. The workstation operating area should be part of the workstation not of the passageway.

5.1.3.3 Passageway Dimensions

The distance from the bridge front bulkhead, or from any consoles or installations placed against the front bulkhead, to any consoles or installations placed away from the bridge front should be sufficient for two persons to pass each other. The distance of a passageway between the front bulkhead and any consoles should preferably be at least 1 000 mm, and not less than 800 mm.

5.2 Work Environment

5.2.1 Climate

5.2.1.1 Effective Temperature

The optimum range of effective temperature for accomplishing light work while dressed appropriately for the season or climate is 21 - 27 °C in a warm climate or during the summer, and 18 - 24 °C in a colder climate or during the winter.

5.2.1.2 Temperature Differences

Temperature difference between any two points within the workplace should be maintained below 5 °C, e.g. the temperature of the air at floor level and at head level.

5.2.1.3 Humidity

Humidity should be maintained between 20 % and 60% with 40 % to 45 % preferred. Approximately 45% relative humidity should be provided at 21°C. This value should decrease with rising temperatures, but should remain above 20 % to prevent irritation and drying of body tissues, eyes, skin, and respiratory tract.

5.2.2 Ventilation and Air-conditioning

5.2.2.1 Air-conditioning

The wheelhouse should be equipped with an adequate air-conditioning or mechanical ventilation system to regulate temperature and humidity. The temperature and the humidity should be adjustable within the limits of the foregoing requirements 5.2.1, by closed wheelhouse doors and windows.

5.2.2.2 Hot Air Discharge

Heating systems should be designed so that hot air discharge is not directed at personnel.

5.2.2.3 Cold Air Discharge

Air conditioning systems should be designed such that cold air discharge is not directed at personnel.

5.2.2.4 Air Velocities

Ventilating systems should not produce air velocities exceeding 0,5 m/s. If possible, the preferred air velocity of 0,3 m/s should be used to preclude manual pages from being turned or papers from being blown off work surfaces.

5.2.3 Noise and Acoustics

Workplace noise should be maintained at levels that do not: (1) interfere with necessary voice, telephone and radio communications, (2) cause fatigue or injury and (3) degrade overall system effectiveness.

5.2.4 Vibration

Uncomfortable levels of vibration should be avoided on the bridge. Vibrations on the bridge should be reduced to such extent that the bridge personnel are neither hindered in their functions nor put at a health risk.

5.2.5 Illumination and Lighting

A satisfactory level of lighting should be available to enable the bridge personnel to complete such tasks as maintenance, chart and office work satisfactorily, both at sea and in port, daytime and night time.

5.2.5.1 Dark Adaptation

Red or filtered white light should be used to maintain dark adaptation whenever possible in areas or on items of equipment requiring illumination in the operational mode. This should include devices in the bridge wings.

5.2.5.2 Luminance Contrast

High contrast in luminance between work area and surrounding should be avoided, i.e. luminance of the task area should not be greater than 3 times the average luminance of the surrounding area.

5.2.5.3 Flexible Lighting System

The lighting system should enable the bridge personnel to adjust the lighting in brightness and direction as required in different areas of the bridge and by the needs of individual devices. The following table lists the recommended general illumination:

Place	Colour/Illumination
Bridge, night	Red or filtered white, continuously variable from 0 to 20 lux
Adjacent corridors and rooms, day	White, continuously variable from 0 to at least 300 lux
Adjacent corridors and rooms, night	Red or filtered white, continuously variable from 0 to 20 lux
Obstacles, night	Red spotlights, continuously variable from 0 to 20 lux
Chart table, day	White floodlight, continuously variable from 0 to 1000 lux White spotlights, continuously variable from 0 to 100 lux
Chart table, night	Filtered white floodlight or spotlights, continuously variable from 0 to 20 lux

5.2.5.4 Light Dimming

A light dimming capability should be provided.

5.2.5.5 Glare Avoidance

Up most care should be taken to avoid glare and stray image reflections in the bridge environment.

5.2.5.6 Lighting Sources

Lighting sources should be designed and located to avoid creating glare from working and display surfaces.

5.2.5.7 Reflection in Windows

Reflection in windows of devices, instruments and consoles and other reflective enclosures should be avoided.

5.2.5.8 Glare and Reflection Avoidance

Devices should be designed and fitted to minimize glare or reflection or being obscured by strong light.

5.2.5.9 Flicker Avoidance

Light sources should not have a perceptible flicker.

5.2.5.10 Lighting Controls

Lighting controls should be provided at entrances and exits of enclosed workplace areas.

5.2.5.11 Lighting Control Illumination

Lighting controls should be illuminated.

5.2.5.12 Interior Colour Design

For the interior nonsaturated colours should be chosen which give a calm overall impression and minimize reflectance. Bright colors should not be used. Dark or mid-green colours are recommended, alternatively blue or brown may be used.

5.2.6 Occupational Safety

5.2.6.1 Non-slip Surfaces

Wheelhouse, bridge wings and upper bridge decks should have non-slip surfaces.

5.2.6.2 General Wheelhouse Safety

There should be no sharp edges or protuberances which could cause injury to personnel.

5.2.6.3 Hand and Grab Rails

Sufficient hand- or grab-rails should be fitted to enable personnel to move or stand safely in bad weather. Protection of stairway openings should be given special consideration.

5.2.6.4 Safety Equipment Marking

All safety equipment carried on the bridge should be clearly marked, be easily accessible and have its stowage position clearly indicated.

5.3 Workstation Layout

5.3.1 Consoles

5.3.1.1 Workstation Area

The workstations for navigating and manoeuvring, monitoring and for the bridge wings should be planned, designed and placed within an area spacious enough for not less than two operators, but close enough for the workstations to be operated by one person.

5.3.1.2 Single Operator Console Width for Seated Operations

The console should be dimensioned and configured so that all relevant controls can be reached from a sitting position.

5.3.1.3 Left-to-Right Viewing Angle

The console should be designed that from the normal working position the total required left-to-right viewing angle should not exceed 190°. This angle shall be reduced whenever possible through appropriate control-display layout.

5.3.1.4 Console Height

The top of the consoles should not exceed a height of 1200 mm.

5.3.1.5 Console Leg Room

The upper leg room of the console should have a minimum of 450 mm in depth and the lower leg room a minimum of 600 mm in depth.

5.3.1.6 Chart Table Dimensions

The chart table should be large enough to accommodate all chart sizes normally used internationally for maritime traffic.

5.3.1.7 Chair Design

Chairs at workstations designed for a sitting position should be capable of rotating with the foot rest being arrested, adjustable in height, and capable of being arrested on the floor. Chairs should be movable out of the operating area.

5.3.2 Device, Control and Display Integration

5.3.2.1 Logical Arrangement

The devices, displays and controls should be fitted in a logical arrangement and combined into function groups.

5.3.2.2 Location Consistency

Location of recurring functional groups and individual items should be similar from console to console.

5.3.2.3 Visual Information for more than one User

Displays providing visual information to more than one person on duty should be located for easy viewing by all users concurrently, or if this is not possible, the displays should be duplicated.

5.3.2.4 Control and Display Location

Controls and their associated displays should be located that the information on the displays can be easily read, during the operation of the controls.

5.3.2.5 Simultaneous Use

A visual display that must be monitored concurrently with manipulation of a related control should be located so that the operator is not required to observe the display from an extreme visual angle and thus introduce the possibility of parallax error.

5.3.2.6 Control/Indicator Discernability

Controls or combined controls/indicators should be visually and tactually distinguishable from elements which only indicate.

5.3.2.7 High Priority Displays

Where two operators must use the same display, and the displays have high priority duplicate sets should be provided whenever there is adequate space. Otherwise, displays should be centred between the operators, alternatively they can be placed that they can be easily monitored by both operators, e.g., above the front window.

5.3.2.8 Centring of Shared Displays

Where two operators must use the same display, and secondary displays must be shared, they should be centred between the operators if they are equally important to each operator. If the displays are more important to one operator than to the other, they should be placed nearest the operator having the principal requirements for using them, alternatively they can be placed that they can be easily monitored by both operators, e.g., above the front window.

5.3.3 Arrangement and Grouping of Controls

5.3.3.1 Control Placement

Controls requiring frequent or accurate settings should not be placed more than 675 mm from the front edge of the console.

5.3.3.2 Control Positioning for Simultaneous Operation

Controls should be located so that simultaneous operation of two controls will not necessitate a crossing or interchanging of hands.

5.3.3.3 Location of Primary and Frequently Used Controls

The most important and frequently used controls should have the most favourable position with respect to ease of reaching and grasping (particularly rotary controls and those requiring fine settings), e.g., keys for emergency functions should have a prominent position.

5.3.3.4 Consistent Arrangement

The arrangement of functionally similar or identical controls should be consistent from workstation to workstation, panel to panel throughout the bridge.

5.3.3.5 Spacing Between Controls

Appropriate spacing between the controls should be provided.

5.3.4 Display Arrangement

5.3.4.1 Immediate Field of View

The most important and/or frequently used displays should be located within the operator's immediate field of view (viewing area with eye rotation only) (Fig. 5.1).

5.3.4.2 Preferred Viewing Area

The preferred viewing area should be reserved exclusively for the most important and/or frequently used displays (Fig. 5.1).

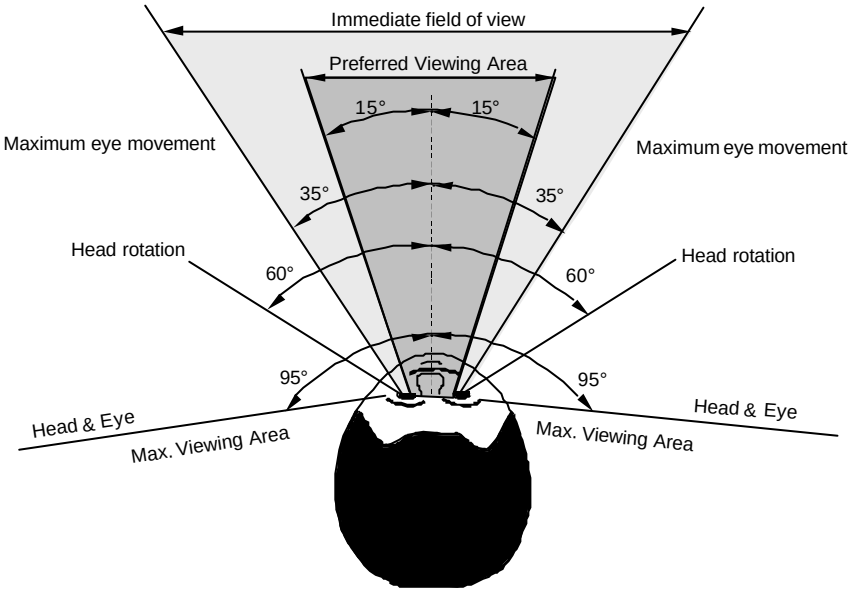


Fig. 5.1: Horizontal field of view

5.3.5 Labelling of Controls and Displays

5.3.5.1 Functional Labelling

Controls and displays should be labelled clearly and unequivocally according to its function, possibly by using standardized symbols.

5.3.5.2 Label Terminology

The selection and use of terminology for labels should be consistent between controls and displays.

5.3.6 Lighting of Devices

5.3.6.1 Adjustable Lighting

Adjustable lighting (dimming control) should be provided for controls and visual displays, including display, control, and panel labels and critical markings, that must be read at night or under darkened conditions. The range of the dimming control should permit the displays to be legible under all ambient illumination conditions.

5.3.6.2 Dimming Capabilities

The lighting of the devices should be continuously or multiple step adjustable down to zero, except the lighting of warning and alarm indicators and the control of the dimmers which should remain readable.

5.3.6.3 Individual Lighting Adjustment

Each device should be fitted with an individual lighting adjustment. In addition functional groups of devices, displays and controls should be equipped with common light adjustment.

5.4 Alarms

5.4.1 Alarm Management

5.4.1.1 Alarm Acknowledgement

A method of acknowledging all alarms (silence audible alarms and set visual alarms to steady state), including the indication of the source of the alarm, should be provided at the navigating and manoeuvring workstation, to avoid distraction by alarms which require attention but have no direct influence on the safe navigation of the ship and which do not require immediate action to restore or maintain the safe navigation of the ship.

5.4.1.2 Fire and Emergency Alarms

The alarm indicators and controls of the fire alarm and emergency alarm should be located at the safety workstation.

5.4.1.3 Failure or Reduction of Power Supply

Alarms should be provided to indicate failure or reduction in the power supply which would effect the safe operation of the equipment.

5.4.1.4 Sensor Input Failure or Absence

Alarms should be provided to indicate sensor input failure or absence.

5.4.1.5 Alarm Status

Alarm systems should clearly distinguish between alarm, acknowledged alarm, and no alarm (normal condition).

5.4.1.6 Acknowledgement of Alarms

Alarms should be maintained until they are acknowledged.

5.4.1.7 Cancellation of Alarms

Alarms and acknowledged alarm should only be capable of being cancelled if the alarm condition is rectified. This cancellation should only be possible at the individual equipment.

5.4.1.8 Alarm Minimization

The number of alarms should be minimized.

5.4.1.9 Alarm Testing

Provision should be made for functionally testing alarms.

5.4.1.10 Power supply

Required alarm systems should be continuously powered and should have an automatic change-over to a stand-by power supply in case of loss of normal power supply.

5.4.1.11 Indication of Alarms

Alarms should be indicated in order of sequence and provided with aids for decision-making. An explanation or justification of an alarm should be available (on request).

5.4.1.12 Presentation of Alarms

The presentation of alarms should be clear, distinctive, unambiguous, and consistent.

5.4.1.13 Modes of Alarms

All required alarms should be presented through both visual and auditory means.

5.4.2 Visual Alarms

5.4.2.1 Discrimination of Visual Alarms

Visual alarms should clearly differ from routine information on displays.

5.4.2.2 Presentation of Visual Alarms

Visual alarms should be flashing. The flashing display should change to steady display upon acknowledgement.

5.4.2.3 Presentation of Acknowledged Alarms

Acknowledged alarms should be presented by steady display.

5.4.2.4 Presentation of Normal Conditions (No Alarm)

Alarm indicators should be designed to show no light in normal conditions (no alarm) or should be non-existent on displays.

5.4.2.5 Flash Rate

Flashing visual alarms should be illuminated for at least 50 % of the cycle and have a pulse frequency in the range of 0.5 Hz to 1.5 Hz.

5.4.2.6 Night Vision

Visual alarms on the navigating bridge should not interfere with night vision.

5.4.3 Audible Alarms

5.4.3.1 Use of Audible Alarms

Audible alarms should be used simultaneously to visual alarms.

5.4.3.2 Audible Alarms

Audible alarms should go off upon acknowledgement.

5.4.3.3 Focusing on Audible Alarms

Audible alarms should be differentiated from routine signals, such as bells, buzzers, and normal operation noises.

5.4.3.4 Sound Characteristic

Under normal working conditions, the alarm signals should be heard properly inside the wheelhouse and outside in the bridge wings, their sound characteristics should not be inconvenient to the human ear.

5.4.3.4.1 Sound Pressure

Audible alarm sound pressure, one metre from the source should be at least 75 dB(A), and at least 10 dB(A), or preferable 20 dB(A), above ambient noise levels existing during normal operations. Audible alarm sound pressures in a space should not exceed 115 dB(A).

5.4.3.4.2 Sound Frequency

With the exception of bells, audible alarms should have a signal frequency between 200 Hz and 2500 Hz, with the preferable range between 500 Hz and 1500 Hz.

5.5 Input Devices

5.5.1 Movement of Controls

Movement of a control forward, clockwise to the right, or up, should turn the equipment or component on, cause the quantity to increase, to move forward, clockwise, to the right, or up.

5.5.2 Corresponding Movements

Controls should be selected so that the direction of movement of the control will be consistent with the related movement of an equipment component, or vessel. The direction of motion of operating elements for manoeuvring equipment should correspond with the direction of the effect on the ship caused by the installations controlled.

5.5.3 Return to Navigation Monitoring Mode

When a single device is used simultaneously for voyage planning and navigation monitoring it should be possible to revert to the monitoring mode with a single operator action.

5.5.4 Minimal User Actions

Control actions should be simple, particularly for real-time tasks requiring fast user response; control logic should permit completion of a transaction sequence with the minimum number of actions.

5.5.5 Consistency of Control Actions

The same functions should be activated on devices by the same control actions, as far as practicable.

5.5.6 Feedback

Visual, auditory or mechanical feedback should be provided to indicate that a controller input has been registered.

5.5.7 Operation of Controls

Controls should be easy to identify and operate.

5.5.8 Accessibility of Controls for Important Functions

The controls for the most important and/or frequently used functions should be easily visible and accessible to the user from the normal working position.

5.5.9 Operation of Controls for Important Functions

The controls for the most important and/or frequently used functions should require only a single actuation to accomplish their function.

5.5.10 Assignment of Controls of Important Functions

The controls for the most important and/or frequently used functions should be assigned to only one function.

5.5.11 Accidental Input or Actuation Prevention

The system should be designed to prevent the accidental manipulation of controls, e.g. physical protection, which could result in changes to the status of the system, the system functions, components, or data, e.g. loss of power.

5.6 Information Display

5.6.1 General Display Requirements

5.6.1.1 Lack of Ambiguity

Display indicators should clearly and unambiguously direct and guide the appropriate control response.

5.6.1.2 Use of Digital Displays

Digital displays should be used for the presentation of quantitative data when exact values are required and continuos trend or rate of change information is not required.

5.6.1.3 Digital Readout

A digital readout should not be used when the information changes with a frequency of more than 0,5 Hz; a higher frequency may be used when the information perception from other displays is not disturbed.

5.6.1.4 Update of Information

The displayed information should be continuously updated.

5.6.1.5 Information Duration

For signals or displays which frequently or consistently change their outputs, the information displayed should have duration's of sufficient length to be reliably detected under expected operator workload and operational environment.

5.6.1.6 Display Simplicity

Displays should present the simplest information consistent with their function; information irrelevant to the task should not be displayed, and extraneous text and graphics should not be present.

5.6.1.7 Only Necessary Data Displayed

Displayed data should be tailored to users needs, providing only necessary and immediately usable data for any transaction. Displays should not be overloaded with extraneous data.

5.6.1.8 Uncluttered Displays

Displays should be as uncluttered as possible.

5.6.1.9 Display of Important Information

Highly important and/or frequently used information should be permanently displayed.

5.6.1.10 Display Fields for the Display of Important Information

The display fields for the presentation of the most important and/or frequently used information should be assigned exclusively to them and should not be used to display any other information.

5.6.1.11 Graphic Display Enhancement With Numeric Values

When precise reading of a graphic display is required, the display should be annotated with actual data values to supplement their graphic representation.

5.6.1.12 Indication of Scale

The scale of maps and charts (data) shown on the display should always be indicated.

5.6.1.13 Aiding Distance Judgements

When a user must judge distances accurately on a map or other graphic display, computer aids should be provided for that judgement.

5.6.2 Arrangement of Visual Information

5.6.2.1 Screen Organization

A standard display screen organization should be evident for the location of various system functions (such as a data display zone, control zone, message zone) from one display to another.

5.6.2.2 Grouping of Information in a Display

Information on a display should be grouped according to obvious principles, e.g., by task, system, function, sequence, etc., based upon the user's requirements in performance of the ongoing task.

5.6.2.3 Demarcation of Groups

Information groups should be visually distinct, e.g., separated by blanks, lines, colour coding, or other means.

5.6.2.4 Consistent Presentation

The arrangement and presentation of identical visual information should be consistent from application to application.

5.6.3 Visual Display Units (VDU)

5.6.3.1 Night Display

All information should be presented emitting as little light as possible at night.

5.6.3.2 Day and Night Legibility

Displays should be capable of being read day and night.

5.6.3.3 Background Colour

A single neutral background colour should be used that has a hue which allows the information (foreground) to be easily visible and which does not distort or interfere with the coding aspects of the display.

5.6.3.4 VDU Resolution

The display should have adequate resolution; i.e., users can discriminate all display elements and codes from the maximum intended viewing distance.

5.6.3.5 VDU Contrast

The contrast ratio of the display should be greater than 3 : 1 and less than 15 : 1; a contrast ratio of 7 : 1 is preferred.

5.6.3.6 Background Luminance

A background luminance level of 15 cd/m^2 to 20 cd/m^2 should be used at daylight.

5.6.3.7 Display Luminance

The display luminance should be between 80 cd/m^2 to 160 cd/m^2 at daylight.

5.6.3.8 Flicker

The display should be "flicker free"; the refresh rate should have a minimum of 65 Hz.

5.6.3.9 Image Continuity

The display should maintain the illusion of a continuous image, i.e., users should not be able to resolve scan lines or matrix spots.

5.6.3.10 CRT Image Linearity

The display should be free of geometric distortion.

5.6.4 Coding and Highlighting

5.6.4.1 Highlighting Selected Data

When a user is performing an operation on some selected display item, that item should be highlighted.

5.6.4.2 Flash Coding

Red flash coding should be reserved for Alarms.

5.6.4.3 Redundant Colour Coding

Colour coding should be redundant with some other display feature, i.e. add colour coding after displays have already been designed as effectively as possible in a monochrome format.

5.6.4.4 Easily Discriminable Colours

When selecting colours for coding discrete categories of data, those colours should be easily discriminable.

5.6.4.5 Minimum Colour Differences

When colour coding is used for discriminability or conspicuity of displayed information, all colours in the set should differ from one another by a minimum of 40 ΔE (CIE L*u*v*) distances.

5.6.4.6 Establishing Standards for Shape Coding

When shape coding is used, codes should be based on established standards or conventional meanings.

5.6.5 Display Elements

5.6.5.1 Font Style

A clearly legible font should be utilized. Fonts should have true ascenders and descenders, uniform stroke width, and uniform aspect ratio. .

5.6.5.2 Meaningful Abbreviations

When abbreviations or acronyms are used, they should be meaningful, in common usage and kept to a minimum.

5.6.5.3 Units of Measurement

The units of measurement (volts, psi, inches, etc.) should be labelled.

5.6.5.4 Appropriate Use of Icons

Icons should be designed to look like the objects, processes, or operations they represent, by use of literal, functional, or operational representations.

5.6.5.5 Representation and Discrimination

Each icon or symbol should represent only one object or function, and should be easily discriminable from all other icons and symbols.

5.6.5.6 Size

Icons and symbols should be large enough for the user to perceive the representation and discriminate it from other icons and symbols.

5.6.5.7 Highlighting

An icon or symbol that the user has selected should be highlighted.

5.6.5.8 Scaling in Standard Intervals

Scales should have tick marks at a standard interval of 1, 2, 5, or 10 (or multiples of 10) for labelled divisions; intervening tick marks to aid visual interpolation should be consistent with the labelled scale interval.

5.6.5.9 Expansion of Graphic Displays

When a graphic display has been expanded from its normal coverage, some scale indicator of the expansion factor should be provided.

5.6.5.10 Unobtrusive Grids

When grid lines are displayed, they should be unobtrusive and not obscure data elements (e.g., curves, plotted points).

5.7 Interactive Control

5.7.1 General User Input Guidelines

5.7.1.1 Consistent Procedures

Procedures for entering commands or information should be consistent in form.

5.7.1.2 Standard Procedures

Standard procedures should be used for updating and deleting information.

5.7.1.3 Consistent Wording of Commands

All terms employed in the user-system interface, and their abbreviations, should be consistent in meaning from one transaction to another, and from one task to another.

5.7.1.4 Unnecessary Entry of Information

A user should not be required to re-enter information already entered to the system.

5.7.1.5 Only Available Options Offered

Only control options that are actually available for the current transaction should be offered to users.

5.7.2 User Input Formats

5.7.2.1 Logical Ordering of Menu Options

Menu options should be ordered and grouped logically.

5.7.2.2 Consistent Design of Hierarchic Menus

The display format and selection logic of hierarchic menus should be consistent at every level.

5.7.2.3 Consistent Display of Menu Options

When menus are provided in different displays, they should be designed so that option lists are consistent in wording and ordering.

5.7.2.4 Minimal Steps in Sequential Menu Selection

When users must step through a sequence of menus to make a selection, the hierarchic menu structure should be designed to minimize the number of steps required.

5.7.2.5 Return to Higher-Level Menus

Users should have to take only one simple key action to return to the next higher level in hierarchic menus.

5.7.2.6 Return to General Menu

Users should have to take only one simple key action to return to the general menu at the top level in hierarchic menus.

5.7.2.7 Explanatory Title for Menu

An explanatory title should be provided for each menu that reflects the nature of the choice to be made, so that the function of the menu is evident to the user.

5.7.2.8 ON/OFF Menu Items

For menu items that can be in an "On" or "Off" state, the "On" state should be indicated by making the item perceptually distinct.

5.7.2.9 Form Filling for Command Entry

Form filling should be provided as an aid for composing complex command entries.

5.7.3 System Operational Information

5.7.3.1 Indicating System Status

The system status should be indicated to users at all times.

5.7.3.2 Operational Mode

The currently selected mode should clearly be indicated, when the results of user action are contingent upon different operational modes.

5.7.3.3 Status and Type of External Sensors

The type and status of external sensors should be permanently indicated.

5.7.3.4 Presentation of Planned and Actual Data

When a device is used for planning it must be clear to the user that this mode is selected so that there is no confusion between the presentation of planned and actual data.

5.7.3.5 Source of Position Information

The information of position should be displayed with an indication of its source.

5.7.3.6 Simulated Operations

Simulated operations should be clearly distinguished from real operations.

5.7.4 System Response

5.7.4.1 Standard Display Location

System messages should appear in standard locations.

5.7.4.2 Familiar Wording

System messages should use familiar terminology.

5.7.4.3 Periodic Feedback

When system functioning requires the user to stand-by, periodic feedback should be provided to indicate normal system operation.

5.7.4.4 Distinctive and Consistent Warnings

Warnings should be distinctive and consistent.

5.7.4.5 Informative Error Messages

When the information systems detects an error, an error message should be displayed stating the error and possible subsequent operations.

5.7.4.6 Task-Oriented Error Messages

Error messages should be appropriate to the task.

5.7.4.7 On-Line Guidance

Users should be able to request on-line guidance information regarding system capabilities, procedures, commands and abbreviations, etc..

5.7.5 Prevention/Detection/Correction of Errors

5.7.5.1 Protection from Data Loss by Interruption

When a proposed user action will interrupt a current transaction sequence, automatic means to prevent data loss should be provided.

5.7.5.2 Segregating Real from Simulated Data

When simulated data and system functions are displayed or provided, real data should be protected.

APPENDIX 1

DEFINITIONS

Alarm: An alarm announces by audible means, or audible and visual means, a condition of an abnormal situation requiring attention.

Alphanumerics: Characters presented on a visual display as letters, numbers, digits, and usually other characters, such as punctuation marks or combinations of them.

Ambient Light: Light originating from sources other than the operator's visual displays, i.e., the general level of illumination on the bridge due to sunlight or lights and lamps.

Ambient Noise: All of the background sounds in the work environment, e.g., the general level of background noise on the shipbridge.

Brightness: An attribute of visual sensation that is determined by the intensity of light radiation reaching the eye. Along with hue and saturation, a component of perceived colour.

Character: A letter, digit, or other symbol that is used as part of the organization, control, or representation of data. A character is often in the form of a spatial arrangement of adjacent or connected strokes.

Character Size: Measured by the height of a displayed character in terms of its visual angle.

Coding: Use of a system of symbols, shapes, colors, or other variable sensory stimuli to represent specific information.

Console: The structural framework for the integration of devices, equipment, and storage and which together compromise a workstation.

Contrast: The difference in luminance between foreground objects and their background or, generally, between any two areas of a display, measured with the contrast ratio (division of the luminance of the foreground by the luminance of the background).

Control: A mechanism used to regulate or guide the operation of a machine, equipment component, subsystem, or system.

Cursor: A highlighted, moveable indicator on the computer screen that shows the current location for data entry, editing, or selection of a displayed object.

Display (Visual): Means which presents visual information, including conventional instrumentation.

Display Field: An area of the display screen reserved for the display of information.

Effective Temperature: An index which combines into a single value the effect of temperature, humidity, and air movement on the sensation of warmth or cold felt by the human body. The numerical value is that of the temperature of still, saturated air which would induce an identical sensation.

Ergonomics: The study and design of working environments (e.g., workstation, cockpit, ship bridges) and their components, work practices, and work procedures for the benefit of the worker’s productivity, health, comfort, and safety. Application of the human factor in the analysis and design of equipment, work and working environment.

Field of Vision: Angular size of a scene that can be observed from a position on the ship's bridge.

Glare: Excessive demand for visual adaptation brought on by the retina's exposure to more light than it can tolerate. Produced when any luminance within the visual field is sufficiently greater than the luminance to which the eye is adjusted.

Highlighting: Emphasizing displayed data or format features, e.g., through the use of underlining, bolding, or inverse video, for calling the user's attention to some displayed area or information.

Hue: One component of the perception of colour (for example, red, green, yellow). Other components are saturation and brightness.

Icon: Pictorial or other nonverbal representation of objects or actions.

Illumination: The amount of light (luminance flux) falling on a surface, measured in lumen/m^2 = lux.

Input Device: A workstation component used for data entry and display control, e.g., keyboard, trackball, mouse.

Label: Alphanumeric information that identifies or describes an object or displayed data.

Layout: The physical arrangement of the parts and components that make up a module or a unit of equipment.

Line of Sight: An imaginary line extended from the plane of the viewer's eyes; the horizontal line of sight occupies the same horizontal plane as the centre of the pupils. The normal line of sight declines 15 degrees below the horizontal; maintaining a horizontal or higher line of sight takes effort and can be fatiguing over time.

Luminance: Luminance is the amount per unit area emitted or reflected from a surface and is measured in candela per square meters (cd/m^2).

Menu: A set of related options listed together for selection by the user, i.e. a type of dialogue in which a user selects one item out of a list of displayed alternatives.

Mode: An internally defined state or condition of computer operation, such as keyboard input mode, help mode, edit mode, save mode, planning mode or operational mode.

Reflection: A mirror image of the surrounding environment that is coincidentally superimposed on screen content.

Resolution: A characteristic of a visual display, expressed in pixels per square inch.

Symbol: A graphic or alphanumeric representation of something by reason of relationship, association, or convention.

Workstation: The combination of all job-related items, including the console with all devices, equipment and the furniture, to fulfil certain tasks.

APPENDIX 2

PROPOSED EQUIPMENT FOR WORKSTATIONS

Workstation for navigating and manoeuvring	
Equipment	Accessory
• radar / radar plotting • ECDIS • automatic visual position indicator • information of position fixing systems • information of Automatic Ship Identification System (AIS) • (adjustment) heading / track control system • controls for main engine(s) incl. crash manoeuvres, emergency stop • controls for main rudder (incl. override facility) • controls for thruster • indications for ∗ for propeller revolutions (actual and desired) ∗ main engine revolution in the case of reduction geared engine ∗ propeller pitch in the case of controllable pitch propeller ∗ torque ∗ starting air ∗ lateral thrust ∗ speed (possibly longitudinal and lateral) ∗ rudder angle ∗ rate-of-turn ∗ gyro compass heading ∗ magnetic compass heading ∗ heading reminder (pre-set heading) ∗ water depth incl. depth warning adjustment ∗ time ∗ wind direction and velocity ∗ air and water temperature + ∗ group alarms (with aids for decision-making) • signal transmitter for ∗ whistle ∗ automatic device for fog signals, ∗ general alarm ∗ morse signalling light • automatic device for emergency alarm • controls for console lighting • two-way VHF radiotelephone (walkie-talkie) with charging connection and/or paging system • internal communication equipment • public address system • VHF point with channel selector • remote control for search light • rudder pump selector switch • steering mode selector switch • steering position selector switch • controls for windscreen wiper, washer, heater • night vision equipment • sound reception system • acknowledgement of watch alarm	• sufficient shelves for binoculars, ashtray cup, etc. • writing space • adjustable chair

Workstation for monitoring	
Equipment	Accessory
• radar / radar plotting • signal transmitter for whistle • acknowledgement of watch alarm • indications for ∗ propeller revolutions ∗ pitch of controllable pitch propeller ∗ speed ∗ rudder angle ∗ gyro compass heading ∗ time ∗ rate-of-turn ∗ water depth ∗ alarms • internal communication equipment • VHF point with channel selector • Controls for windscreen wiper, washer, heater	• shelf for binoculars etc. • shelf for notes etc. • adjustable chair

Workstation for manual steering (helmsman's)	
Equipment	Accessory
• steering wheel / steering lever • rudder pump selector switch • indications for ∗ gyro compass heading ∗ magnetic compass heading ∗ pre-set heading ∗ rudder angle ∗ rate of turn • talkback to bridge wing workstation • controls for windscreen wiper, washer, heater	• adjustable chair

Workstation for docking (bridge wing)	
Equipment	Accessory

• controls for main engine(s)
• controls for thruster
• controls for rudder
• controls for whistle
• steering position selector switch
• indications for
  * gyro compass heading
  * propeller revolutions
  * main engine revolution in the case of reduction geared engine
  * propeller pitch in the case of controllable pitch propeller
  * lateral thrust
  * rate-of-turn
  * rudder angle
  * longitudinal and lateral movement of ship
  * wind direction and velocity
• talkback system to the workstations navigating and manoeuvring, monitoring, manual steering, and to manoeuvring stations, except muster stations
• system for external communication with tugs, pilot boat (VHF point)
• controls for morse lamp and searchlight
• acknowledgement of watch alarm	

Workstation for planning and documentation	
Equipment	Accessory
• ECDIS including navigation planning station • route planning devices • chart table • position fixing receiver • retaining device for drawing triangles, dividers, magnifying lens, pencils, etc. • weather chart plotter • main clock • chronometer with receiving facility for time signals • radio direction finder • log, incl. distance indicator, course plotter • echograph • barograph • indication for air and water temperature [+] • command printer • VHF point	• facility for storing charts • facility for storing nautical publications, manuals, etc.

Workstation for safety	
Equipment	Accessory
• fire alarm for areas machinery, superstructure/accommodations, cargo • remote control and monitoring of fire-extinguishing system • remote control and monitoring of watertight doors/fire doors (open/closed) • emergency stop for air condition, ventilation and refrigerating installations • controls for anti-rolling device • indicator for bilge monitor • indicator for strength load incl. alarm • indicator for further safety systems • clinometer • keys and control-elements for lights and signals (navigation lights, signal lamps, bridge lighting, deck lighting searchlights, as well as all fuses) • internal communication system, in particular to muster stations • adjustment of watch alarm system and acknowledgement button • status indication for bow-, rearflap • controls/indications for ballast water handling • tools for documentation • main station for two-way VHF radiotelephone (walkie-talkie) [++]	• writing space

Workstation for communications	
Equipment	Accessory
• GMDSS equipment as required for the applicable sea area: ∗ VHF-DSC, radiotelephone ∗ MF-DSC, radiotelephone ∗ MF/HF-DSC, NBDP, radiotelephone ∗ Inmarsat-SES ∗ NAVTEX/EGC/HF direct printing telegraph ∗ EPIRB trigger ∗ main station for two-way VHF radiotelephone (walkie-talkie) [++]	• writing space • chair

[+] Located at the workstation for navigating and manoeuvring or at the workstation for planning and documentation.

[++] Located at the safety or communication workstation.

APPENDIX 3

EXISTING INTERNATIONAL STANDARDS DEALING WITH ERGONOMIC CRITERIA FOR BRIDGE EQUIPMENT AND LAYOUT

		Relevant Requirements	For additional Information	
	Contents of the Guidelines	IMO Resolutions and Guidelines	IEC Standards	ISO Standards
Work Stations	4	MSC/Circ.603 Annex 2, 1993		ISO 8468 ISO 14612
Ergonomic requirements	5.1 Bridge Layout	SOLAS Chapter V, reg. 22		ISO 8468
	5.2 Work Environment			ISO 8468
	5.3 Work Station Layout	IMO A.694(17)	IEC 60945 rev.4	ISO 8468 ISO 14612
	5.4 Alarms	IMO A.839(19) MSC.64(67) IBS MSC.86(70) INS	IEC 60945 rev.4 IEC 61209 IEC 61924	ISO 8468
	5.5 Input Devices	IMO A.694(17)	IEC 60945 rev.4	
	5.6 Information Display	IMO A.694(17)	IEC 60945 rev.4 IEC 60936 IEC 60872 IEC 61174	
	5.7 Interactive Control	IMO A.694(17)	IEC 60945 rev.4	
Equipment at workstations	Appendix 2	MSC/Circ.603 Annex, 1993		ISO 14612

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ANNEX 9

DRAFT REVISION OF RESOLUTION A.860(20)

MARITIME POLICY AND REQUIREMENTS FOR A FUTURE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO resolutions A.529(13) on Accuracy Standards for Navigation and A.815(19) on the World-Wide Radionavigation System,

RECOGNIZING the need for a future civil and internationally-controlled global navigation satellite system (GNSS) to contribute to the provision of navigational position-fixing for maritime purposes throughout the world for general navigation, including navigation in harbour entrances and approaches and other waters in which navigation is restricted,

RECOGNIZING ALSO that the maritime needs for a future GNSS are not restricted to general navigation only, requirements for other maritime applications should also be considered as the strict separation between general navigation and other navigation and positioning applications can not always be made, and the intermodal use of GNSS is expected to increase in the future.

RECOGNIZING FURTHER the need to identify early the maritime user requirements for a future GNSS to ensure that such requirements are taken into account in the development of such a system,

BEING AWARE of the current work of the International Civil Aviation Organization (ICAO) on the aviation requirements for a future GNSS,

HAVING CONSIDERED the recommendation made by the Maritime Safety Committee at its [seventy-third] session,

1. ADOPTS the Maritime Policy and Requirements for a Future Global Navigation Satellite System (GNSS), set out in the Annex to the present resolution;

2. INVITES Governments and international organizations providing or intending to provide services for the future GNSS to take account of the annexed Maritime Requirements in the development of their plans and to inform the Organization accordingly;

3. REQUESTS the Maritime Safety Committee to keep this policy and requirements under review and to adopt amendments thereto, as necessary.

4. REVOKES resolution A.860(20)

ANNEX

MARITIME POLICY AND REQUIREMENTS FOR A FUTURE GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)

1 INTRODUCTION

1.1 A Global Navigation Satellite System (GNSS) is a satellite system that provides world-wide position, velocity and time determination for multi-modal use. It includes user receivers, one or more satellite constellations, ground segments and a control organization with facilities to monitor and control the world-wide conformity of the signals processed by the user receivers to pre-determined operational performance standards. A set of relevant definitions and a glossary are included in Appendix 1 to this annex.

1.2 For maritime users IMO is the international organization that will recognise a GNSS as a system which meets the carriage requirements for position-fixing equipment for a World-Wide Radionavigation System (WWRNS). The formal procedures and responsibilities for the recognition of a GNSS should be in accordance with paragraph 2 of the Annex to resolution A.815(19) on WWRNS, as far as applicable.

1.3 The present satellite navigation systems (see paragraph 2) are expected to be fully operational until at least the year 2010. Future GNSS(s) will improve, replace or supplement the present satellite navigation systems, which have shortcomings in regard to integrity, availability, control and system life expectancy (see paragraph 2).

1.4 Maritime users are expected to be only a small part of the very large group of users of a future GNSS. Land mobile users are potentially the largest group. Maritime users may not have the most demanding requirements.

1.5 Early identification of the maritime user requirements is intended to ensure that these requirements are considered in the development of future GNSS(s).

1.6 There are rapid developments in the field of radionavigation, radiocommunication and information technology. Developments in these technologies for maritime use have to be taken into consideration.

1.7 The long period required to develop and implement a GNSS has led the Organization to determine the maritime requirements for future GNSS(s) at an early stage.

1.8 However, as development of future GNSS(s) is presently only in a design stage, these requirements have been limited only to basic user requirements, without specifying the organizational structure and system architecture. The maritime requirements, as well as the Organization's recognition procedures, may need to be revised as a result of any subsequent developments.

1.9 When proposals for a specific future GNSS are presented to IMO for recognition, these proposals will be assessed on the basis of any revised requirements.

1.10 Early co-operation with air and land users and providers of services is essential to ensure that a multi-modal system is provided in the time expected.

2 PRESENT SITUATION

2.1 Currently two State-owned military-controlled satellite navigation systems are available for civilian use. These systems are mainly used in shipping, in aviation, and in land mobile transport; the systems are also used for hydrography, survey, timing, agricultural, construction and scientific purposes. For maritime use the following aspects of each system are most relevant:

.1 GPS*

.1.1 The Global Positioning System (GPS) is a space-based three-dimensional positioning, three-dimensional velocity and time system which is operated for the Government of the United States by the United States Air Force. GPS achieved full operational capability (FOC) in 1995. The system will undergo a modernisation programme between 2002 and 2010, when the performance of the system will be improved.

.1.2 GPS is expected to be available for the foreseeable future, on a continuous, world-wide basis and free of direct user fees. The United States expects to be able to provide at least six years notice prior to termination or elimination of GPS. This service, which is available on a non-discriminatory basis to all users has, since FOC, met accuracy requirements for general navigation with a horizontal position accuracy of 100 metres (95%).

1.3 Accordingly, GPS has been recognized as a component of the World-Wide Radionavigation System (WWRNS) for navigation use in waters other than harbour entrances and approaches and restricted waters.

.1.4 Without augmentation, GPS accuracy does not meet the requirements for navigation in harbour entrances and approaches or restricted waters. GPS does not provide instantaneous warning of system malfunction. However, differential corrections can enhance accuracy (in limited geographic areas) to 10 metres or less (95%) and also offer external integrity monitoring. Internal integrity provision is possible by autonomous integrity monitoring using redundant observations from either GNSS or other (radio) navigation systems or both.

.2 GLONASS*

.2.1 GLONASS (Global Navigation Satellite System) is a space-based three-dimensional positioning, three-dimensional velocity and time system, which is managed for the Government of the Russian Federation by the Russian Space Agency.

* **Note**. When GPS and GLONASS are mentioned in this Annex the Standard Position Services (SPS) provided by these systems are being referred to.

.2.2 GLONASS has been recognized as a component of the WWRNS. GLONASS was declared fully operational in 1996, and was declared to be operational at least until 2010 for unlimited civilian use on a long-term basis and to be free of direct-user fees. Early in 2000, the intended space segment was not fully available.

.2.3 GLONASS is meant to provide long-term service for national and foreign civil users in accordance with existing commitments. When fully operational, the service will meet the requirements for general navigation with a horizontal position accuracy of 45 metres (95%). Without augmentation, GLONASS accuracy is not suitable for navigation in harbour entrances and approaches.

.2.4 GLONASS does not provide instantaneous warning of system malfunction. However, augmentation can greatly enhance both accuracy and integrity. Differential corrections can enhance accuracy to 10 metres or less (95%) and offer external integrity monitoring. Internal integrity provision may be possible by using redundant observations from either GNSS or other (radio) navigation systems or both.

2.2 There are several techniques that can improve the accuracy and/or integrity of GPS and GLONASS by augmentation. The widespread use of differential correction signals from stations using the appropriate maritime radionavigation frequency band between 283.5 and 325 kHz for local augmentation and craft or receiver autonomous integrity monitoring may be mentioned as examples. In addition, integrated receivers are already developed and in development, combining signals from GPS, GLONASS, LORAN-C and/or Chayka. Wide area augmentation systems are also being developed using differential correction signals from geostationary satellites such as EGNOS for Europe, WAAS for the United States and MSAS for Japan. Receivers for these augmentation systems are being developed.

2.3 Within the overall context of radionavigation the developments concerning terrestrial systems must also be taken into consideration. DECCA is phased out in many countries, OMEGA was phased out in 1997. The future of the United States controlled LORAN-C networks is under consideration. However, the Russian Federation-controlled CHAYKA networks will not be considered for phasing out until at least the year 2010. Civil-controlled LORAN-C and LORAN-C/Chayka networks are in operation in the Far East, North-West Europe and other parts of the world, with plans for extension in some areas. A number of Loran-C and Chayka stations are transmitting on an experimental basis differential GPS correction.

3 MARITIME REQUIREMENTS FOR A FUTURE GNSS

3.1 The maritime requirements for a future GNSS can be subdivided into the following general, operational, institutional and transitional requirements:

General requirements

.1 A future GNSS should primarily serve the operational user requirements for general navigation. This includes navigation in harbour entrances and approaches, and other waters in which navigation is restricted.

.2 A future GNSS should also serve other operational navigation and positioning purposes where applicable.

.3 A future GNSS should have the operational and institutional capability to meet additional area-specific requirements through local augmentation, if this capability is not otherwise provided. Augmentation provisions should be harmonised world-wide to avoid the necessity of carrying more than one shipborne receiver or other devices.

.4 A future GNSS should have the operational and institutional capability to be used by an unlimited number of multi-modal users at sea, in the air and on land.

.5 A future GNSS should be reliable and of low user cost. With regard to the allocation and recovery of costs, a distinction should be made between maritime users that rely on the system for reasons of safety and those that additionally benefit from the system in commercial or economic terms. Also the interests of both shipping and the coastal States should be taken into consideration when dealing with allocation and recovery of costs.

.6 Some possible cost-recovery options are identified as follows:

- through funding by international organizations concerned (IMO, ICAO, etc.);

- through cost-sharing between Governments or commercial entities (e.g. satellite communication providers); or

- through private investments and direct user charges or licensing fees.

Operational requirements

.7 Future GNSS(s) should meet the maritime user's operational requirements for general navigation, including navigation in harbour entrances and approaches and other waters where navigation is restricted. The minimum maritime user requirements for general navigation are given in Appendix 2 to this Annex.

.8 Future GNSS(s) should meet the maritime operational requirements for positioning applications. The minimum maritime user requirements for positioning are given in Appendix 3 of this Annex.

.9 Future GNSS(s) should operate with the geodetic and time reference systems compatible with present satellite navigation systems.

.10 Service provider(s) are not responsible for the performance of the shipborne equipment. This equipment should meet performance standards adopted by IMO.

.11 The development and use of integrated receivers using future GNSS(s) and terrestrial systems is recommended.

.12 Future GNSS(s) should enable shipborne equipment to provide the user with information on position, time, course and speed over the ground.

.13 Shipborne equipment for GNSS(s), including integrated receivers mentioned in 3.11, should have a data interface capability with other shipborne equipment to provide and/or use information for navigation and positioning such as: ECDIS, AIS, the GMDSS, track control, VDR, ship heading and attitude indication and ship motion monitoring.

.14 Users should all be timely informed of degradations in performance of individual satellite signals and/or of the total service, by the provision of integrity messages.

Institutional requirements

.15 Future GNSS(s) should have institutional structures and arrangements for control by an international civil organization in particular representing the contributing Governments and users.

.16 International civil organizations should have institutional structures and arrangements to enable (supervision of) the provision, operation, monitoring and control of the system(s) and/or service(s) to the predetermined requirements at minimum cost.

.17 These requirements can be achieved either by the use of existing organization(s) or by the establishment of new organization(s). An organization can provide and operate the system by itself or monitor and control the service provider.

.18 IMO itself is not in a position to provide and operate a GNSS. However, IMO has to be in a position to assess and recognise the following aspects of a GNSS:

- provision of the service to maritime users on a non-discriminatory basis;
- operation of the GNSS in respect of its ability to meet maritime user requirements;
- application of internationally established cost-sharing and cost-recovery principles; and
- application of internationally established principles on liability issues.

Transitional requirements

.19 Future GNSS(s) should be developed in parallel to, or could evolve in part or in whole from the present satellite navigation systems.

.20 A regional satellite navigation system that is fully operational may be recognised as a component of the WWRNS[*].

[*] **Note**: (see resolution A.815(19)).

.21 Shipborne receivers or other devices required for a future GNSS should, where practicable, be compatible with the shipborne receiver or other devices required for the present satellite navigation systems.

4 REQUIRED ACTIONS AND TIME-SCALE

4.1 The continuing involvement of IMO will be necessary. The maritime requirements given in this Annex should be continually reassessed and updated on the basis of new developments and specific proposals.

4.2 The involvement of IMO should be positive and interactive and the Organization should consider establishing a forum whereby meaningful discussions can take place with air and land users, to resolve difficult mutual institutional matters and consider a joint way forward.

4.3 Recognizing that ICAO is studying the aviation requirements for a GNSS and that there are prospects of a Joint IMO/ICAO Planning Group for the development of the GNSS, close contacts between IMO and ICAO are necessary.

4.4 International, regional and national organizations, as well as individual companies, involved in the development of future GNSSs, should be informed of the requirements set by IMO for acceptance of a future GNSS. These IMO requirements should be incorporated in their GNSS plans to be accepted for maritime use.

4.5 The anticipated time-scale for introduction of future GNSSs is given in Appendix 4 to this Annex. The time-scales for the expected introduction and phasing out of radionavigation systems, such as the present satellite navigation systems, the augmentation facilities and terrestrial systems, are also included in Appendix 4. The time-scales of these systems determine the time-scale for the decision-making process within IMO.

4.6 For the early and orderly participation of IMO in the introduction of future GNSS(s), the process of decision-making should include means to:

- review this resolution periodically;
- consider proposals urgently when submitted; and,
- recognise new systems when submitted.

Appendix 1

Terms used in GNSS

Accuracy. The degree of conformance between the estimated or measured parameter of a craft at a given time and its true parameter at that time. (Parameters in this context may be position co-ordinates, velocity, time, angle, etc.)

- *Absolute accuracy (Geodetic or Geographic accuracy).* The accuracy of a position estimate with respect to the geographic or geodetic co-ordinates of the Earth.

- *Geodetic or Geographic accuracy*. See Absolute accuracy.

- *Predictable accuracy.* The accuracy of the estimated position solution with respect to the charted solution.

- *Relative accuracy*. The accuracy with which a user can determine position relative to that of another user of the same navigation system at the same time.

- *Repeatable accuracy*. The accuracy with which a user can return to a position whose co-ordinates have been measured at a previous time using uncorrelated measurements from the same navigation system.

Alert limit (or threshold value). The maximum allowable error in the measured position - during integrity monitoring - before an alarm is triggered.

Along-track error. The component of the Vessel Technical Error in the direction of the intended track.

Ambiguity. The condition obtained when one set of measurements derived from a navigation system defines more than one point, direction, line of position or surface of position.

Augmentation. Any technique of providing enhancement to the GNSS in order to provide improved navigation performance to the user.

- *Satellite-based augmentation system (SBAS).* A system providing additional satellite signals in order to enhance the performance of the GNSS service.

- *Ground-based augmentation system (GBAS).* A system providing additional signals from a ground-based station in order to enhance the performance of the GNSS service.

Availability. The percentage of time that an aid, or system of aids, is performing a required function under stated conditions. The non-availability can be caused by scheduled and/or unscheduled interruptions.

- *Signal availability.* The availability of a radio signal in a specified coverage area.

- *System availability.* The availability of a system to a user, including signal availability and the performance of the user's receiver.

Chart error. Position errors in the chart caused by inaccuracies in surveying and by errors in the reference geodetic system.

Circular error probable (CEP). The radius of a circle, centred on the measured position, inside which the true position lies with 50% confidence.

Confidence interval. The numerical range within which an unknown is estimated to be with a given confidence.

Confidence level. The percentage of confidence that a given statement is correct, or the percentage of confidence that a stated interval (numerical range) includes an unknown.
Confidence limits. The extremes of a confidence interval.

Continuity. The probability that, assuming a fault free receiver, a user will be able to determine position with specified accuracy and is able to monitor the integrity of the determined position over the (short) time interval applicable for a particular operation within a limited part of the coverage area.

Correction. The numerical value of a correction is the best estimate that can be made of the difference between the true and the measured value of a parameter. The sign is such that a correction that is to be added to an observed reading is taken as positive.

Coverage. The coverage provided by a radionavigation system is that surface area or space volume in which the signals are adequate to permit the user to determine position to a specified level of performance.

Cross-track error. The component of the Vessel Technical Error perpendicular to the intended track.

Craft autonomous integrity monitoring (CAIM). This is a technique whereby various navigation sensor information available on the craft is autonomously processed to monitor the integrity of the navigation signals. (See also Receiver autonomous integrity monitoring.)

Differential system. An augmentation system whereby radionavigation signals are monitored at a known position and the corrections so determined are transmitted to users in the coverage area.

Dilution of precision. The factor by which the accuracy of the GNSS position and time co-ordinates are degraded by geometrical considerations of the constellation of GNSS satellites used by the receiver.

- *Geometric dilution of precision (GDOP).* The factor for the combined 3D-position and time accuracy.
- *Position dilution of precision* (PDOP). The factor for the 3D-position accuracy.
- *Horizontal dilution of precision (HDOP).* The factor for the horizontal position accuracy.
- *Vertical dilution of precision (VDOP).* The factor for the vertical accuracy.
- *Time dilution of precision (TDOP).* The factor for the time accuracy.

Distance root mean square (dRMS). The root mean square of the radial distances from the true position to the observed positions obtained from a number of trials.

Failure. The unintended termination of the ability of a system, or part of a system, to perform its required function.

Failure rate. The average number of failures of a system, or part of a system, per unit time. (See also mean time between failures.)

Fix. A position determined by processing information from a number of navigation observations.

Fix rate. The number of fixes per unit time.

Fix interval (seconds). The maximum time in seconds between fixes.

Global navigation satellite service. The signal in space provided to the user by GNSS space and ground segments.

GLONASS (Global Navigation Satellite System). This is a space-based, radio positioning, navigation and time-transfer system operated by the Government of the Russian Federation.

Global Navigation Satellite System (GNSS). A world-wide position, time and velocity radio determination system comprising space, ground and user segments.

GNSS service. The service relates to the properties of the signal in space provided by the space and ground segments of the GNSS.

GNSS system. The system relates to the properties of the GNSS service plus the receiver.

Global Positioning System (GPS). This is a space-based, radio positioning, navigation and time-transfer system operated by the United States Government.

Gross errors. Gross errors, or "outliers", are errors other than random errors or systematic errors. They are often large and, by definition, unpredictable. They are typically caused by sudden changes in the prevailing physical circumstances, by system faults or operator errors.

Integrated navigation system. A system in which the information from two or more navigation aids is combined in a symbiotic manner to provide an output that is superior to any one of the component aids.

Integrity. The ability to provide users with warnings within a specified time when the system should not be used for navigation.

Integrity monitoring. The process of the determination whether the system performance (or individual observations) allow use for navigation purposes. Overall GNSS system integrity is described by three parameters: *the threshold value or alert limit, the time to alarm and the integrity risk.* The output of integrity monitoring is, that individual (erroneous) observations or the overall GNSS system can not be used for navigation.

- *Internal integrity monitoring* is performed aboard a craft

- *External integrity monitoring* is provided by external stations

Integrity risk. The probability that a user will experience a position error larger than the threshold value without an alarm being raised within the specified time-to-alarm at any instant of time at any location in the coverage area.

Latency. The time lag between the navigation observations and the presented navigation solution.

Marginally detectable bias (MDB). The minimum size of the gross error in an observation that may be detected with given probabilities of type 1 and type 2 errors. A type 1 error occurs when an observation without a gross error is wrongly rejected, and a type 2 error occurs when an observation with a gross error is wrongly accepted.

Marginally detectable error (MDE). The maximum position-offset caused by a MDB in one of the observations.

Mean time between failures (MTBF). The average time between two successive failures of a system or part of a system.

Navigation. The process of planning, recording and controlling the movement of a craft from one place to another.

Navigation system error (NSE). The combined error of the GNSS position estimate and the *chart error*. The maximum NSE can be described by:

NSEmax = Chart error + GNSS error + other navigation errors

Pseudolite (pseudo satellite). A ground-based augmentation station transmitting a GNSS-like signal providing additional navigation ranging for the user.

Precision. The accuracy of a measurement or a position with respect to random errors.

PZ-90 geodetic system. A consistent set of parameters used in GLONASS describing the size and shape of the Earth, positions of a network of points with respect to the centre of mass of the Earth, transformations from major geodetic datums and the potential of the Earth, developed in 1990.

Radio determination. The determination of position, or the obtaining of information relating to position, by means of the propagation properties of radio waves.

Radiolocation. Radio determination used for purposes other than radionavigation.

Radionavigation. The use of radio signals to support navigation for the determination of position or direction, or for obstruction warning.

Random error. That error of which only the statistical properties can be predicted.

Receiver autonomous integrity monitoring (RAIM). A technique whereby the redundant information available at a GNSS receiver is autonomously processed to monitor the integrity of the navigation signals. (See also craft autonomous integrity monitoring.)

Redundancy. The existence of multiple equipment or means for accomplishing a given function in order to increase the reliability of the total system.

Reliability (of an observation). A measure of the effectiveness with which gross errors may be detected. This “internal” reliability is usually expressed in terms of the marginally detectable bias (MDB).

Reliability (of a position fix). A measure of the propagation of a non-detected gross error in an observation, to the position fix. This "external" reliability is usually expressed in terms of the marginally detectable error (MDE).

Repeatability. The accuracy of a positioning system, taking into account only the random errors. The repeatability is normally expressed in a 95% probability circle.

Root mean square error (RMS). RMS error refers to the variability of a measurement in one dimension. In this one dimensional case, the RMS error is also an estimate of the standard deviation of the errors.

Single point of failure. That part of a navigation system that lacks redundancy, so that a failure in that part would result in a failure of the whole system.

Systematic error. An error which is non-random in the sense that it conforms to some kind of pattern.

Service capacity. The number of users a service can accommodate simultaneously.

Threshold value (or alert limit) is the maximum allowable error in the measured position –during integrity monitoring - before an alarm is triggered.

Time to alarm. The time elapsed between the occurrence of a failure in the system and its presentation on the bridge.

Total System Error (TSE). The overall navigation performance can be described by the TSE. Assuming the contributions to TSE from NSE and VTE are random, the TSE can be described as:

$$TSE^2 = NSE^2 + VTE^2$$

True position (2D). The error-free latitude and longitude co-ordinates in a specified geodetic datum.

True position (3D). The error-free latitude, longitude and height co-ordinates in a specified geodetic datum.

Vessel Technical Error (VTE) . This is the difference between the indicated craft position and the indicated command or desired position. It is a measure of the accuracy with which the craft is controlled.

World geodetic system (WGS). A consistent set of parameters describing the size and shape of the Earth, positions of a network of points with respect to the centre of mass of the Earth, transformations from major geodetic datums and the potential of the Earth.

GLOSSARY

AIS	Automatic Identification System
CAIM	Craft Autonomous Integrity Monitoring
Chayka	A radionavigation system, similar to Loran-C, operated by the Government of the Russian Federation
Decca Navigator	A low frequency hyperbolic radionavigation system based on phase comparison techniques
DGPS	Differential GPS
EGNOS	European Geostationary Navigation Overlay Service
EU	European Union
FOC	Full Operational Capability
DTOA	The Difference in Time Of Arrival of events in two signals
GLONASS	Global Navigation Satellite System, operated by the Government of the Russian Federation
GMDSS	Global Maritime Distress and Safety System
GNSS	Global Navigation Satellite System
GNSS-1	Global Navigation Satellite System, based on augmentation of GPS and GLONASS in development by the EU.
GNSS-2	Future Global Navigation Satellite System in development by the EU
GPS	Global Positioning System operated by the Government of the United States
HSC	High Speed Craft
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
ICAO	International Civil Aviation Organisation
IHO	International Hydrographic Organisation
IMO	International Maritime Organisation
IOC	Initial Operational Capability
ITU	International Telecommunication Union
LAAS	Local Area Augmentation System
LADGNSS	Local Area Differential GNSS
LORAN-C	A low frequency hyperbolic radionavigation system based on measurements of TOA or DTOA of events in pulsed signals
MSAS	Multi-purpose Satellite Augmentation System developed by the Government of Japan
MSC	Maritime Safety Committee

NAV	Sub-Committee on Safety on Navigation of IMO
NSE	Navigation System Error
RAIM	Receiver Autonomous Integrity Monitoring
SAR	Search and Rescue
SIS	Signal in Space
TOA	Time Of Arrival of an event in a signal
TSE	Total System Error
VDR	Voyage Data Recorder
VTE	Vessel Technical Error
VTS	Vessel Traffic Services
WAAS	Wide Area Augmentation System developed by the Government of the United States
WRC	World Radio Conference of the ITU
WWRNS	World Wide Radio Navigation System

Appendix 2

Table of the minimum maritime user requirements for general navigation

	System level parameters				Service level parameters			
	Absolute Accuracy	Integrity			Availability % per 30 days	Continuity % over 3 hours	Coverage	Fix interval[2] (seconds)
	Horizontal (metres)	Alert limit (metres)	Time to alarm[2] (Seconds)	Integrity risk (per 3 hours)				
Ocean	10	25	10	10^{-5}	99.8	N/A[1]	Global	1
Coastal	10	25	10	10^{-5}	99.8	N/A[1]	Global	1
Port approach and restricted waters	10	25	10	10^{-5}	99.8	99.97	Regional	1
Port	1	2.5	10	10^{-5}	99.8	99.97	Local	1
Inland waterways	10	25	10	10^{-5}	99.8	99.97	Regional	1

Notes: 1: Continuity is not relevant to ocean and coastal navigation
2: More stringent requirements may be necessary for ships operating above 30 knots

Appendix 3

Tables showing the minimum maritime user requirements for positioning

	System level parameters					Service level parameters			
	Accuracy		Integrity			Availability % per 30 days	Continuity % over 3 hours	Coverage	Fix interval[2] (seconds)
	Horizontal (metres)	Vertical[1] (metres)	Alert limit (metres)	Time to alarm[2] (Seconds)	Integrity risk (per 3 hours)				
Operations	**Relative accuracy**								
• tugs and pushers	1		2.5	10	10^{-5}	99.8	99.97	Local	1
• icebreakers	1		2.5	10	10^{-5}	99.8	99.97	Local	1
• automatic collision avoidance	10		25	10	10^{-5}	99.8	99.97	Global	1
	Absolute accuracy								
• track control	10	N/A	25	10	10^{-5}	99.8	99.97	Global	1
• automatic docking	0.1		0.25	10	10^{-5}	99.8	99.97	Local	1
Traffic management[3]	**Absolute accuracy**								
• ship-to-ship co-ordination	10		25	10	10^{-5}	99.8	99.97	Global	1
• ship-to-shore co-ordination	10		25	10	10^{-5}	99.8	99.97	Regional	1
• shore-to-ship traffic management	10		25	10	10^{-5}	99.8	99.97	Regional	1

Notes: 1: There may be a requirement for accuracy in the vertical plane for some port and restricted water operations
2: More stringent requirements may be necessary for ships operating above 30 knots
3: Traffic management applications in some areas, e.g. the Baltic, may require higher accuracy.

Table 1: Manoeuvring and traffic management applications.

Appendix 3, continued

	System level parameters					Service level parameters			
	Accuracy		Integrity			Availability % per 30 days	Continuity % over 3 hours	Coverage	Fix interval (seconds)
	Horizontal (metres)	Vertical (metres)	Alert limit (metres)	Time to alarm (Seconds)	Integrity risk (per 3 hours)				
Search and rescue	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
Hydrography	1 - 2	0.1	2.5 - 5	10	10^{-5}	99.8	N/A	Regional	1
Oceanography	10	10	25	10	10^{-5}	99.8	N/A	Global	1
Marine engineering, construction, maintenance and management									
• dredging	0.1	0.1	0.25	10	10^{-5}	99.8	N/A	Local	1
• cable and pipeline laying	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1
• construction works	0.1	0.1	0.25	10	10^{-5}	99.8	N/A	Local	1
Aids to navigation management	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1

Table 2: Search and rescue, hydrography, oceanography, marine engineering, construction, maintenance and management and aids to navigation management

Appendix 3, continued

	System level parameters					Service level parameters			
	Accuracy		Integrity			Availability	Continuity	Coverage	Fix interval[1]
	Horizontal (metres)	Vertical (metres)	Alert limit (metres)	Time to alarm[1] (Seconds)	Integrity risk (per 3 hours)	% per 30 days	% over 3 hours		(seconds)
Port operations	**Absolute accuracy**								
• local VTS	1	N/A	2.5	10	10^{-5}	99.8	N/A	Local	1
• container/cargo management	1	1	2.5	10	10^{-5}	99.8	N/A	Local	1
• law enforcement	1	1	2.5	10	10^{-5}	99.8	N/A	Local	1
• cargo handling	0.1	0.1	0.25	1	10^{-5}	99.8	N/A	Local	1
Casualty analysis	**Predictable accuracy**								
• ocean	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• coastal	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• port approach and restricted waters	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1
Offshore exploration and exploitation	**Absolute accuracy**								
• exploration	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1
• appraisal drilling	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1
• field development	1	N/A	2.5	10	10^{-5}	99.8	N/A	Regional	1
• support to production	1	N/A[2]	2.5	10	10^{-5}	99.8	N/A	Regional	1
• post-production	1	N/A[2]	2.5	10	10^{-5}	99.8	N/A	Regional	1

Notes: 1: More stringent requirements may be necessary for ships operating above 30 knots.
2: A vertical accuracy of a few cm (less than 10) is necessary to monitor platform subsidence.

Table 3: Port operations, casualty analysis, and offshore exploration and exploitation

Appendix 3, continued

	System level parameters					Service level parameters			
	Accuracy		Integrity			Availability % per 30 days	Continuity % over 3 hours	Coverage	Fix interval[1] (seconds)
	Horizontal (metres)	Vertical (metres)	Alert limit (metres)	Time to alarm[1] (Seconds)	Integrity risk (per 3 hours)				
Fisheries	**Absolute accuracy**								
• location of fishing grounds	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• positioning during fishing[2]	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• yield analysis	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• fisheries monitoring	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
Recreation and leisure	**Predictable Accuracy**								
• Ocean	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• Coastal	10	N/A	25	10	10^{-5}	99.8	N/A	Global	1
• Port approach and restricted waters	10	N/A	25	10	10^{-5}	99.8	99.97	Regional	1

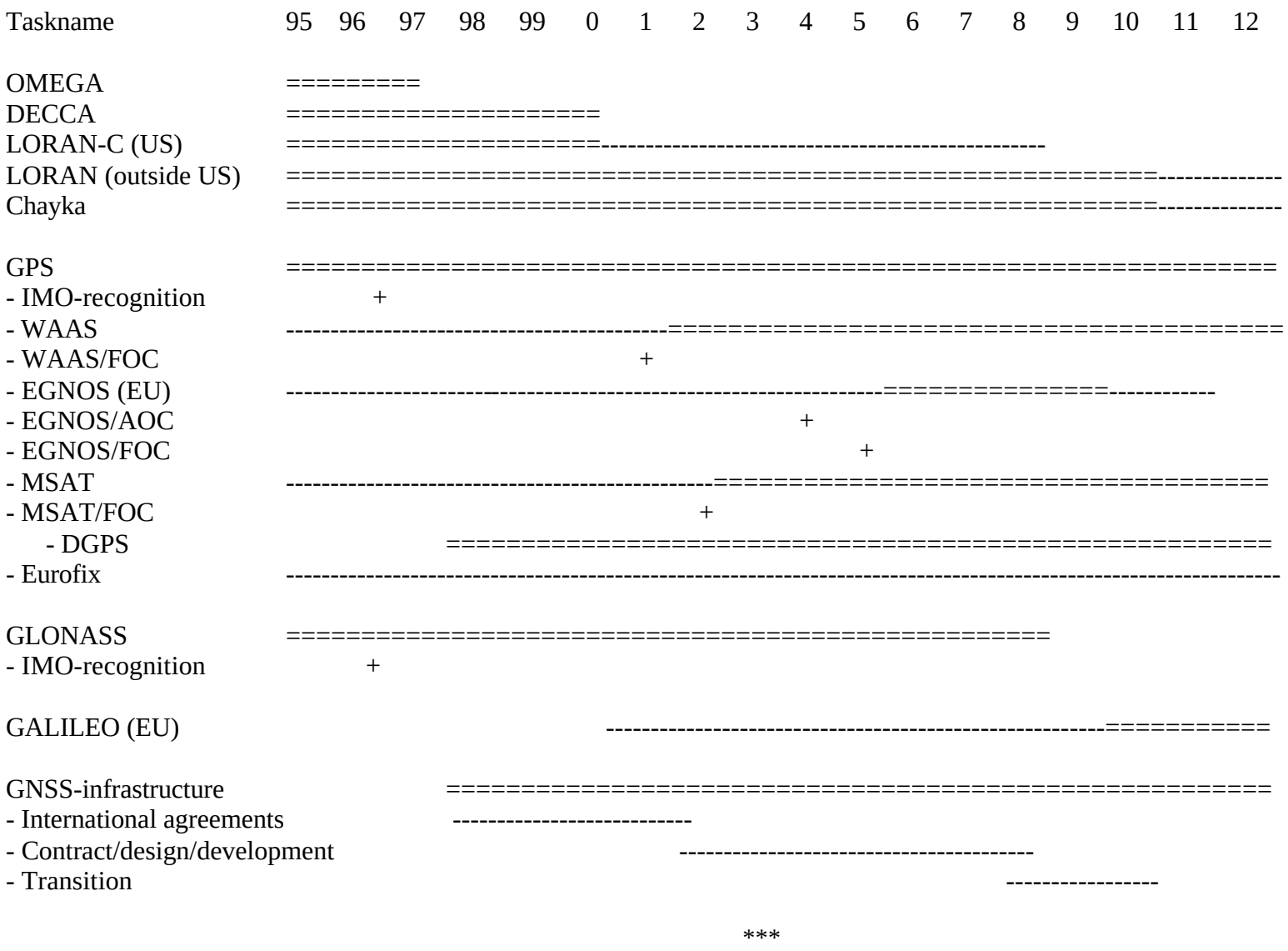
Notes: 1: More stringent requirements may be necessary for ships operating above 30 knots
2. Positioning during fishing in local areas may have more stringent requirements.

Table 4: Fisheries, recreation and leisure applications

Appendix 4

Development of future global navigation satellite systems/GNSSs (Indicative)

Year		95	96	97	98	99	0	1	2	3	4	5	6	7	8	9	10	11	12
Taskname																			
IMO	- intern	==========																	
	- ISWG/1	+																	
	- NAV/41	+																	
	- ISWG/2		+																
	- NAV/42		+																
	- MSC/66		+																
	- NAV/43			+															
	- Assembly/20			+															
	- Assembly/21					+													
	- MSC/73						+												
	- Assembly/22							+											
ITU		==========																	
	- Agenda WRC 2000					+													
	WRC 2000 and 2003																		
	- allocate frequency						+				+								


Taskname
95 96 97 98 99 0 1 2 3 4 5 6 7 8 9 10 11 12
OMEGA
DECCA
LORAN-C (US)
LORAN (outside US)
Chayka
GPS
- IMO-recognition
- WAAS
- WAAS/FOC
- EGNOS (EU)
- EGNOS/AOC
- EGNOS/FOC
- MSAT
- MSAT/FOC
- DGPS
- Eurofix
GLONASS
- IMO-recognition
GALILEO (EU)
GNSS-infrastructure
- International agreements
- Contract/design/development
- Transition

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ANNEX 10

DRAFT RESOLUTION MSC....(73)
(adopted on ... December 2000)

PERFORMANCE STANDARDS FOR SHIPBORNE GLOBAL POSITIONING SYSTEM (GPS) RECEIVER EQUIPMENT, REVISED IN 2000

THE MARITIME SAFETY COMMITTEE,

RECALLING Article (28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee [and/or the Marine Environment Protection Committee, as appropriate,] on behalf of the Organization,

RECALLING FURTHER that, in accordance with resolution A.815(19) by which the Assembly adopted the IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use to provide ships with navigational position-fixing throughout their voyages, the Global Positioning System (GPS) has been recognized as a possible component of the world-wide radionavigation system,

NOTING that shipborne receiving equipment for the world-wide radionavigation system should be designed to satisfy the detailed requirements of the particular system concerned,

RECOGNIZING the need to improve the previously adopted by resolution A.819(19) performance standards for shipborne GPS receiver equipment in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation on the revision of resolution A.819(19) made by the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the Recommendation on Performance Standards for Shipborne Global Positioning System (GPS) Receiver Equipment, revised in 2000, set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that GPS receiver equipment:

(a) if installed on or after [1 July 2003], conform to performance standards not inferior to those specified in the annex to the present resolution; and

(b) if installed before [1 July 2003], conform to performance standards not inferior to those specified in the annex to resolution A.819(19).

ANNEX

RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE GLOBAL POSITIONING SYSTEM (GPS) RECEIVER EQUIPMENT, REVISED IN 2000

1 INTRODUCTION

1.1 The Global Positioning System (GPS) is a space-based positioning, velocity and time system that has three major segments: space, control and user. The GPS space segment will normally be composed of 24 satellites in six orbits. The satellites operate in circular 20,200 km orbits at an inclination angle of 55° with a 12-hour period. The spacing of satellites in orbit will be arranged so that a minimum of four satellites will be in view to users world-wide, with a position dilution of precision (PDOP) of = 6. Each satellite transmits on two "L" band frequencies, L1 (1575,42 MHz) and L2 (1227,6 MHz). L1 carries a precise (P) code and coarse/acquisition (C/A) code. L2 carries the P code. A navigation data message is superimposed on these codes. The same navigation data message is carried on both frequencies.

1.2 Receiver equipment for the GPS intended for navigational purposes on ships with maximum speeds not exceeding 70 knots should, in addition to the general requirements contained in resolution A.694(17)*, comply with the following minimum performance requirements.

1.3 These standards cover the basic requirements of position-fixing for navigation purposes only and do not cover other computational facilities which may be in the equipment.

2 GPS RECEIVER EQUIPMENT

2.1 The words "GPS receiver equipment" as used in these performance standards include all the components and units necessary for the system properly to perform its intended functions. The equipment should include the following minimum facilities:

.1 antenna capable of receiving GPS signals;

.2 GPS receiver and processor;

.3 means of accessing the computed latitude/longitude position;

.4 data control and interface; and

.5 position display and, if required, other forms of output.

2.2 The antenna design should be suitable for fitting at a position on the ship which ensures a clear view of the satellite constellation.

* Refer to Publication IEC 60945.

3 PERFORMANCE STANDARDS FOR GPS RECEIVER EQUIPMENT

The GPS receiver equipment should:

.1 be capable of receiving and processing the Standard Positioning Service (SPS) signals as modified by Selective Availability (SA) and provide position information in latitude and longitude World Geodetic System (WGS)-84 co-ordinates in degrees, minutes and thousandths of minutes and time of solution referenced to UTC (USNO). Means may be provided for transforming the computed position based upon WGS-84 into data compatible with the datum of the navigational chart in use. Where this facility exists, the display should indicate that co-ordinate conversion is being performed, and should identify the co-ordinate system in which the position is expressed;

.2 operate on the L1 signal and C/A code;

.3 be provided with at least one output from which position information can be supplied to other equipment. The output of position information based upon WGS-84 should be in accordance with international standards;*

.4 have static accuracy such that the position of the antenna is determined to within 100 m (95%) with horizontal dilution of precision (HDOP) = 4 (or PDOP = 6);

.5 have dynamic accuracy such that the position of the ship is determined to within 100 m (95%) with HDOP = 4 (or PDOP = 6) under the conditions of sea states and ship's motion likely to be experienced in ships;**

.6 be capable of selecting automatically the appropriate satellite-transmitted signals for determining the ship's position with the required accuracy and update rate;

.7 be capable of acquiring satellite signals with input signals having carrier levels in the range of -130 dBm to -120 dBm. Once the satellite signals have been acquired, the equipment should continue to operate satisfactorily with satellite signals having carrier levels down to -133 dBm;

.8 be capable of acquiring position to the required accuracy, within 30 min, when there is no valid almanac data;

.9 be capable of acquiring position to the required accuracy, within 5 min, when there is valid almanac data;

.10 be capable of re-acquiring position to the required accuracy, within 5 min, when the GPS signals are interrupted for a period of at least 24 h but there is no loss of power;

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* IEC Publication 61162.

** Refer to resolution A.694(17), Publications IEC 6721-3-6, IEC 60945 and IEC 61108-1.

.11 be capable of re-acquiring position to the required accuracy, within 2 min, when subjected to a power interruption of 60 s;

.12 generate and output to a display and digital interface* a new position solution at least once every 1 s;**

.13 have a minimum resolution of position, i.e. latitude and longitude, of 0.001 minutes;

.14 generate and output to the digital interface* course over the ground (COG), speed over the ground (SOG) and universal time co-ordinated (UTC). Such outputs should have a validity mark aligned with that on the position output. The accuracy requirement for COG and SOG should not be inferior to the relevant Performance Standards for Heading*** and SDME;****

.15 have the facilities to process differential GPS (DGPS) data fed to it in accordance with the standards of Recommendation ITU-R M.823 and the appropriate RTCM standard. When a GPS receiver is equipped with a differential receiver, performance standards for static and dynamic accuracies (paragraphs 3.4 and 3.5 above) should be 10 m (95%); and

.16 be capable of operating satisfactorily in typical interference conditions.

4 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the GPS receiver equipment inputs or outputs for a duration of 5 min.

5 FAILURE WARNINGS AND STATUS INDICATIONS

5.1 The equipment should provide an indication of whether the position calculated is likely to be outside the requirements of these performance standards.

5.2 The GPS receiver equipment should provide as a minimum:

.1 an indication within 5 s if either:

.1.1 the specified HDOP has been exceeded; or

---

* Conforming to the IEC 61162 series.

** For craft meeting the HSC, a new position solution at least every 0.5 s is recommended.

*** Resolution A.424(XI).

**** Resolution A.824(19).

.1.2 a new position has not been calculated for more than 1 s.*

Under such conditions the last known position and the time of the last valid fix, with explicit indication of this state, so that no ambiguity can exist, should be output until normal operation is resumed;

.2 a warning of loss of position;

.3 differential GPS status indication of:

.3.1 the receipt of DGPS signals; and

.3.2 whether DGPS corrections are being applied to the indicated ship's position;

.4 DGPS integrity status and alarm; and

.5 DGPS text message display.

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* For craft meeting the HSC, a new position solution at least every 0.5 s is recommended.

ANNEX 11

DRAFT RESOLUTION MSC.....(73)
(adopted on ... December 2000)

PERFORMANCE STANDARDS FOR SHIPBORNE GLONASS RECEIVER EQUIPMENT, REVISED IN 2000

THE MARITIME SAFETY COMMITTEE,

RECALLING Article (28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee [and/or the Marine Environment Protection Committee, as appropriate,] on behalf of the Organization,

RECALLING FURTHER that, in accordance with resolution A.815(19) by which the Assembly adopted the IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use to provide ships with navigational position-fixing throughout their voyages, the Global Navigation Satellite System (GLONASS) has been recognized as a possible component of the world-wide radionavigation system,

NOTING that shipborne receiving equipment for the world-wide radionavigation system should be designed to satisfy the detailed requirements of the particular system concerned,

RECOGNIZING the need to improve the previously adopted by resolution MSC.53(66) performance standards for shipborne GLONASS receiver equipment in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation on the revision of resolution MSC.53(66) made by the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the Recommendation on Performance Standards for GLONASS Receiver Equipment, revised in 2000, set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that GLONASS receiver equipment:

(a) if installed on or after [1 July 2003], conform to performance standards not inferior to those specified in the Annex to the present resolution; and

(b) if installed before [1 July 2003], conform to performance standards not inferior to those specified in the Annex to resolution MSC.53(66).

ANNEX

RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE GLONASS RECEIVER EQUIPMENT, REVISED IN 2000

1 INTRODUCTION

1.1 The Global Navigation Satellite System (GLONASS) is a space-based positioning, velocity, and time system that has three major segments: Space, Control and User. The GLONASS Space Segment, will normally be composed of 24 satellites placed in three orbital planes with eight satellites in each plane. The satellites operate in circular 19,100 km orbits at an inclination angle of 64.8° and with an 11 h and 15 min period. The spacing of satellites in orbit will be arranged so that a minimum of four satellites will be in view to users world-wide, with a position dilution of precision (PDOP) of $\leq$6. Satellites of the system transmit signals on "L" band frequencies. Each satellite has separate lettered frequencies L1 (1602, 5625-1615.5 MHz).

1.2 Each L1 frequency carries a code standard accuracy (C), which is used in shipborne GLONASS receiver equipment. A navigation data message is superimposed on this code.

1.3 Receiver equipment for the GLONASS intended for navigational purposes on ships with maximum speeds not exceeding 70 knots should, in addition to the general requirements contained in resolution A.694(17)*, comply with the following minimum performance requirements.

1.4 These standards cover the basic requirements of position-fixing for navigation purposes only and does not cover other computational facilities which may be in the equipment.

2 GLONASS RECEIVER EQUIPMENT

2.1 The words "GLONASS receiver equipment" as used in these performance standards include all the components and units necessary for the system to properly perform its intended functions. The equipment should include the following minimum facilities:

.1 antenna capable of receiving GLONASS signals;

.2 GLONASS receiver and processor;

.3 means of accessing the computed latitude/longitude position;

.4 data control and interface; and

.5 position display and, if required, other forms of output.

* Refer to IEC Publication 60945.

2.2 The antenna design should be suitable for fitting at a position on the ship which ensures a clear view of the satellite constellation.

3 PERFORMANCE STANDARDS FOR GLONASS RECEIVER EQUIPMENT

The GLONASS receiver equipment should:

.1 be capable of receiving and processing the Standard Positioning Service (SPS) signals of the GLONASS system and provide position information in latitude and longitude PZ-90 co-ordinates in degrees, minutes and thousandths of minutes and time of solution referenced to UTC (SU). Means should be provided to transform the computed position based upon PZ-90 into WGS-84 or into data compatible with the datum of the navigational chart in use. Where this facility exists, the display should indicate that the co-ordinate conversion is being performed and should identify the co-ordinate system in which the position is expressed;

.2 operate on the Standard Positioning Service (on lettered L1 frequencies and C code);

.3 be provided with at least one output from which position information can be supplied to other equipment. The output of position information based upon PZ-90 or WGS-84, should be in accordance with international standards;[*]

.4 have static accuracy such that the position of the antenna is determined to within 45 m (95%) with horizontal dilution of position (HDOP) = 4 (PDOP = 6);

.5 have dynamic accuracy such that the position of the antenna is determined to within 45 m (95%) with horizontal dilution of position (HDOP) = 4 (PDOP = 6) under the conditions of sea states and ship's motion likely to be experienced in ships;[**]

.6 be capable of selecting automatically the appropriate satellite transmitted signals for determination of the ship's position with the required accuracy and update rate;

.7 be capable of acquiring satellite signals with input signals having carrier levels in the range of - 130 dBm to - 120 dBm. Once the satellite signals have been acquired the equipment should continue to operate satisfactorily with satellite signal having carrier levels down to - 133 dBm;

.8 be capable of acquiring position to the required accuracy, within 30 min, when there is no valid almanac data;

.9 be capable of acquiring position to the required accuracy, within 5 min, when there is valid almanac data;

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[*] IEC Publication 61162.

[**] Resolution A. 694(17), Publications IEC 6721 3-6, IEC 60945 and IEC 61108-2.

.10 be capable of re-acquiring position to the required accuracy, within 5 min, when the GLONASS signals are interrupted for a period of at least 24 h, but there is no loss of power;

.11 be capable of re-acquiring position to the required accuracy, within 2 min, when subjected to a power interruption of 60 s;

.12 generate and output to a display and digital interface* a new position solution at least once every 1 s;**

.13 have a minimum resolution of position, i.e. latitude and longitude of 0.001 minutes;

.14 generate and output to the digital interface* course over the ground (COG), speed over the ground (SOG) and universal time co-ordinated (UTC). Such outputs should have a validity mark aligned with that on the position output. The accuracy requirement for COG and SOG should not be inferior to the relevant Performance Standards for Heading*** and SDME;****

.15 have the facilities to receive and process differential GLONASS (DGLONASS) data fed to it in accordance with the standards of Recommendation ITU-R M.823. When a GLONASS receiver is equipped with a differential receiver, performance standards for static and dynamic accuracies (paragraphs 3.4 and 3.5 above) should be 10 m (95%);***** and

.16 be capable of operating satisfactorily in typical interference conditions.

4 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the GLONASS receiver equipment inputs or outputs for a duration of 5 min.

5 FAILURE WARNINGS AND STATUS INDICATIONS

5.1 The equipment should provide an indication if the position calculated is likely to be outside of the requirements of these performance standards.

5.2 The GLONASS receiver equipment should provide as a minimum:

.1 an indication within 5 s if either:

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* Publication IEC 61162 series.

** For craft meeting the HSC, a new position solution at least every 0.5 s is recommended.

*** Resolution A.424(XI).

**** Resolution A.824(19).

***** Refer to resolution A.815(19) on the World-wide Radionavigation System.

.1.1 the specified HDOP has been exceeded; or

.1.2 a new position has not been calculated for more than 1 s.*

Under such conditions the last known position and the time of the last valid fix, with explicit indication of this state, so that no ambiguity can exist, should be output until normal operation is resumed;

.2 a warning of loss of position;

.3 differential GLONASS status indication of:

.3.1 the receipt of DGLONASS signals; and

.3.2 whether DGLONASS corrections are being applied to the indicated ship's position;

.4 DGLONASS integrity status and alarm; and

.5 DGLONASS text message display.

***

* For craft meeting the HSC, a new position solution at least every 0.5 s is recommended.

ANNEX 12

DRAFT RESOLUTION MSC...(73)
(adopted on ... December 2000)

PERFORMANCE STANDARDS FOR SHIPBORNE DGPS AND DGLONASS MARITIME RADIO BEACON RECEIVER EQUIPMENT, REVISED IN 2000

THE MARITIME SAFETY COMMITTEE,

RECALLING Article (28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee [and/or the Marine Environment Protection Committee, as appropriate,] on behalf of the Organization,

NOTING that differential services broadcast information for augmenting the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS) to provide the accuracy and integrity required for entrances and harbour approaches and other waters in which the freedom to manoeuvre is limited,

NOTING ALSO that shipborne maritime radio beacon receiving equipment providing augmentation information to position-fixing equipment should be designed to satisfy the detailed requirements of the particular system concerned,

RECOGNIZING the need to improve the previously adopted by resolution MSC.64(67), Annex 2 performance standards for shipborne DGPS and DGLONASS maritime radio beacon receiver equipment in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation on the revision of resolution MSC.64(67), Annex 2 made by the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the Recommendation on Performance Standards for Shipborne DGPS and DGLONASS Maritime Radio Beacon Receiver Equipment, revised in 2000, set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that DGPS and DGLONASS maritime radio beacon receiver equipment:

(a) if installed on or after [1 July 2003], conform to performance standards not inferior to those specified in the Annex to the present resolution; and

(b) if installed on or after 1 January 1999 but before [1 July 2003], conform to performance standards not inferior to those specified in the Annex to resolution MSC.64(67), Annex 2.

ANNEX

RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE DGPS AND DGLONASS MARITIME RADIO BEACON RECEIVER EQUIPMENT, REVISED IN 2000

1 INTRODUCTION

1.1 Differential services broadcast information for augmenting the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS) to provide the accuracy and integrity required for entrances and harbour approaches and other waters in which the freedom to manoeuvre is limited. Various service providers are broadcasting differential information applicable to localized areas. Different services provide information for augmenting GPS, GLONASS, or both.

1.2 Receiver equipment for the reception and proper decoding of differential GPS and GLONASS maritime radio beacon broadcasts (fully compliant with Recommendation ITU-R M.823) intended for navigational purposes on ships with maximum speeds not exceeding 70 knots should, in addition to the general requirements contained in resolution A.694(17)[*], comply with the following minimum performance requirements.

1.3 These standards cover the basic requirements of maritime radio beacon receiver equipment providing augmentation information to position-fixing equipment. It does not cover other computational facilities which may be in the equipment.

2 DGPS AND DGLONASS MARITIME RADIO BEACON RECEIVER EQUIPMENT

The words "DGPS and DGLONASS maritime radio beacon receiver equipment" as used in these performance standards include all the components and units necessary for the system to properly perform its intended functions. The equipment should include the following minimum facilities:

.1 antenna capable of receiving DGPS or DGLONASS maritime radio beacon signals;

.2 DGPS and DGLONASS maritime radio beacon receiver and processor;

.3 receiver control interface; and

.4 data output interface.

[*] Refer to IEC Publication 60945.

3 FUNCTIONAL REQUIREMENTS

The DGPS and DGLONASS maritime radio beacon receiver equipment should:

.1 operate in the band of 283.5 to 315 kHz in Region 1 and 285 to 325 kHz in Regions 2 and 3 in accordance with Recommendation ITU-R M.823;

.2 provide means of automatically and manually selecting the station;

.3 make the data available for use with a delay not exceeding 100 ms after its reception;

.4 be capable of acquiring a signal in less than 45 s in the presence of electrical storms;

.5 have at least one serial data output that conforms to the relevant international marine interface standard*;

.6 have an omni-directional antenna in the horizontal plane; and

.7 be capable of operating satisfactorily in typical interference conditions.

4 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the DGPS and DGLONASS maritime radio beacon receiver equipment inputs or outputs for a duration of 5 min.

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* Refer to IEC Publication 61162.

ANNEX 13

DRAFT RESOLUTION MSC...(73)
(adopted on ... December 2000)

PERFORMANCE STANDARDS FOR SHIPBORNE COMBINED GPS/GLONASS RECEIVER EQUIPMENT, REVISED IN 2000

THE MARITIME SAFETY COMMITTEE,

RECALLING Article (28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee [and/or the Marine Environment Protection Committee, as appropriate,] on behalf of the Organization,

RECALLING FURTHER that, in accordance with resolution A.815(19) by which the Assembly adopted the IMO policy for the recognition and acceptance of suitable radionavigation systems intended for international use to provide ships with navigational position-fixing throughout their voyages, the Global Positioning System (GPS) and the Global Navigation Satellite System (GLONASS) have been recognized as possible components of the world-wide radionavigation system,

NOTING that shipborne combined receiving equipment for the world-wide radionavigation system offer improved availability, integrity, accuracy and resistance to interference,

RECOGNIZING the need to improve the previously adopted by resolution MSC.74(69), Annex 1 performance standards for shipborne combined GPS/GLONASS receiver equipment in order to ensure the operational reliability of such equipment and taking into account the technological progress and experience gained,

HAVING CONSIDERED the recommendation on the revision of resolution MSC.74(69), Annex 1 made by the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the Recommendation on Performance Standards for Shipborne Combined Receiver Equipment, revised in 2000, set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that combined GPS/GLONASS receiver equipment:

(a) if installed on or after [1 July 2003], conform to performance standards not inferior to those specified in the Annex to the present resolution; and

(b) if installed before [1 July 2003], conform to performance standards not inferior to those specified in Annex 1 to resolution MSC.74(69).

ANNEX

RECOMMENDATION ON PERFORMANCE STANDARDS FOR SHIPBORNE COMBINED GPS/GLONASS RECEIVER EQUIPMENT, REVISED IN 2000

1 INTRODUCTION

1.1 The Global Positioning System (GPS) and Global Navigation Satellite System (GLONASS) are space-based positioning, velocity and time systems. The GPS space segment will normally be composed of 24 satellites in six orbits. The spacing of satellites in orbit will be arranged so that a minimum of four satellites will be in view to users world-wide, with a position dilution of precision (PDOP) $\leq$ 6. The GLONASS space segment will normally be composed of 24 satellites placed in 3 orbital planes with 8 satellites in each plane. The spacing of satellites in orbit will be arranged so that a minimum of four satellites will be in view to users world-wide, with a PDOP $\leq$ 6.

1.2 A combined receiver, when compared to either the GPS or GLONASS receiver, offers improved availability, integrity, accuracy and resistance to interference; increased ease of installation, and the ability to operate in the differential GPS mode (DGPS), differential GLONASS mode (DGLONASS) and combined DGPS and DGLONASS mode, when available.

1.3 Receiver equipment capable of combining individual satellite measurements from GPS and GLONASS constellations to form a single solution is intended for navigational purposes on ships with maximum speeds not exceeding 70 knots. Such equipment should, in addition to the general requirements contained in resolution A.694(17)*, comply with the following minimum performance requirements.

1.4 These standards cover the basic requirements of position-fixing for navigation purposes only and do not cover other computational facilities which may be in the equipment.

2 COMBINED GPS/GLONASS RECEIVER EQUIPMENT

2.1 The words "combined GPS/GLONASS receiver equipment" as used in these performance standards include all the components and units necessary for the system to properly perform its intended functions. The equipment should include the following minimum facilities:

.1 antenna capable of receiving both GPS and GLONASS signals;

.2 combined GPS/GLONASS receiver and processor;

.3 means of accessing the computed latitude/longitude position;

.4 data control and interface; and

.5 position display.

* Refer to Publication IEC 60945.

2.2 The antenna design should be suitable for fitting at a position on the ship which ensures a clear view of the satellite constellations.

3 PERFORMANCE STANDARDS FOR COMBINED GPS/GLONASS RECEIVER EQUIPMENT

3.1 The combined GPS/GLONASS receiver equipment should:

.1.1 be capable of receiving and processing the Standard Positioning Service (SPS) signals of the GPS as modified by Selective Availability (SA) and range code signals in GLONASS and provide position information in latitude and longitude World Geodetic System (WGS) 84 co-ordinates in degrees, minutes and thousandths of minutes. Means may be provided to transform the computed position into data compatible with the datum of the navigational chart in use. Where this facility exists, the display and any data output should indicate that the co-ordinate conversation is being performed and should identify the co-ordinate system in which the position is expressed;

.1.2 operate on the L1 frequency signal and C/A code in GPS and L1 frequency signal and range code in GLONASS;

.1.3 be provided with at least one output from which position information can be supplied to other equipment. The output of position information should be in accordance with the relevant international standard**s**;[*]

.1.4 have static accuracy such that the position of the antenna is determined to within 35 m (95%) in non-differential mode and 10 m (95%) in differential mode with horizontal dilution of precision (HDOP) $\leq$ 4 or position dilution of precision (PDOP) $\leq$ 6;

.1.5 have dynamic accuracy such that the position of the ship is determined to within 35 m (95%) in non-differential mode and 10 m (95%) in differential mode with HDOP $\leq$ 4 or PDOP $\leq$ 6 under the conditions of sea states and ship's motion likely to be experienced in ships[**];

.1.6 be capable of selecting automatically the appropriate satellite transmitted signals for determination of the ship's position with the required accuracy and update rate;

.1.7 be capable of acquiring satellite signals with input signals having carrier levels in the range of -130 dBm to -120 dBm. Once the satellite signals have been acquired the equipment should continue to operate satisfactorily with satellite signals having carrier levels down to -133 dBm;

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[*] Publication IEC 61162.

[**] Resolution A.694(17); Publications IEC 6721-3-6, IEC 60945 and IEC 61108-3.

.1.8 be capable of acquiring position to the required accuracy, within 30 min, when there is no valid almanac data;

.1.9 be capable of acquiring position to the required accuracy, within 5 min, when there is valid almanac data;

.1.10 be capable of re-acquiring position to the required accuracy, within 5 min, when all GPS and GLONASS signals are interrupted for a period of at least 24 h, but there is no loss of power;

.1.11 be capable of re-acquiring position to the required accuracy, within 2 min, when subjected to a power interruption of 60 s;

.1.12 be capable of re-acquiring an individual satellite signal and utilizing it in the position solution within 10 s after being blocked for 30 s;

.1.13 generate and output to a display and digital interface* a new position solution at least once every 1 s;

.1.14 have a minimum resolution of position, i.e. latitude and longitude of 0.001 minutes;

.1.15 generate output to the digital interface* course over the ground (COG), speed over the ground (SOG) and universal time co-ordinated (UTC). Such outputs should have a validity mark aligned with that on the position output. The accuracy requirement for COG and SOG should not be inferior to the relevant Performance Standards for Heading** and SDME;***

.1.16 have the facilities to process DGPS and DGLONASS data fed to it, in accordance with Recommendation ITU-R M.823 and the appropriate RTCM standard; and

.1.17 be capable of operating satisfactorily in typical interference conditions.

4 PROTECTION

Precautions should be taken to ensure that no permanent damage can result from an accidental short circuit or grounding of the antenna or any of its input or output connections or any of the combined GPS/GLONASS receiver equipment inputs or outputs for a duration of 5 min.

5 FAILURE WARNINGS AND STATUS INDICATIONS

5.1 The equipment should provide an indication if the position calculated is likely to be outside of the requirements of these performance standards.

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* Conforming to Publication IEC 61162 series.

** Resolution A.424(XI).

*** Resolution A.824(19).

5.2 The combined GPS/GLONASS receiver equipment should provide as a minimum:

.1 an indication within 5 s if either:

.1.1 the specified HDOP has been exceeded; or

.1.2 a new position has not been calculated for more than 1 s.

Under such conditions the last known position and the time of the last valid fix, with explicit indication of this state, so that no ambiguity can exist, should be output until normal operation is resumed;

.2 a warning of loss of position;

.3 DGPS and DGLONASS status indication of:

.3.1 the receipt of DGPS and DGLONASS signals; and

.3.2 whether DGPS and DGLONASS corrections are being applied to the indicated ship's position,

.4 DGPS and DGLONASS integrity status and alarm; and

.5 DGPS and DGLONASS text message display.

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ANNEX 14

DRAFT RESOLUTION MSC…(73)
(adopted on … December 2000)

PERFORMANCE STANDARDS FOR MARINE TRANSMITTING HEADING DEVICES (THDs)

THE MARITIME SAFETY COMMITTEE,

RECALLING Article (28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.886(21), by which the Assembly resolved that the function of adopting performance standards and technical specifications, as well as amendments thereto shall be performed by the Maritime Safety Committee [and/or the Marine Environment Protection Committee, as appropriate,] on behalf of the Organization,

RECALLING FURTHER that, in accordance with the revised chapter V of the SOLAS Convention ships of 300 gross tonnage and upwards and less than 500 gross tonnage, which do not carry a gyro compass, are required to carry a THD, or other means to transmit heading information,

RECALLING FURTHER ALSO that in accordance with the HSC Code passenger craft certified to carry 100 passenger or less which do not carry a gyro compass are required to carry an instrument suitable for providing a heading reference,

NOTING that a properly adjusted THD will fulfil these carriage requirements,

RECOGNIZING the need to prepare appropriate performance standards for THDs,

HAVING CONSIDERED the recommendation on the performance standards for THDs made by the Sub-Committee on Safety of Navigation at its forty-sixth session,

1. ADOPTS the Recommendation on Performance Standards for Marine Transmitting Heading Devices (THDs) set out in the Annex to the present resolution;

2. RECOMMENDS Governments to ensure that THDs installed on or after [1 July 2002] conform to performance standards not inferior to those specified in the Annex to the present resolution.

ANNEX

RECOMMENDATION ON PERFORMANCE STANDARDS FOR MARINE TRANSMITTING HEADING DEVICES (THDs)

1 SCOPE

1.1 A Transmitting Heading Device (THD) is an electronic device, which provides information about the ship's true heading.

1.2 In addition to the general requirements contained in resolution A.694(17)* and the relevant standard for the sensing part used, the THD equipment should comply with the following minimum requirements.

1.3 Where the IMO performance standards which apply to the sensing part do not specify a geographical operating area the THD should operate from 70º latitude south to 70º latitude north as minimum.

2 APPLICATION

2.1 The THDs complying with the requirements contained in this recommendation can be used for heading information as contained in Chapter V of the SOLAS Convention.

2.2 In addition such THD should meet the dynamic requirements contained in the HSC Code, chapter 13 for the carriage of a suitable device providing heading information.

3 DEFINITION

3.1 *Heading*: for the purpose of these standards any ship's heading to be input to the THD function.

3.2 *Sensing part*: a sensing function of detecting any heading information connected to the transmitting device.

3.3 *Transmitting part*: device which receives a heading information from the sensing part and convert to the required accurate signal.

3.4 *True heading*: horizontal angle between the vertical plane passing through the true meridian and the vertical plane passing a through the craft's fore and aft datum line. It is measured from true north (000º) clockwise through 360º.

3.5 *Transmission and resolution error*: error which is caused by the method used to transmit the original information to a receiving device. Such method may have a limited capability to code any possible value of the information e.g. step output with 1/6º resolution. This error is caused by the method used inside the THD and at its output to code the information.

* Publication IEC 60945.

3.6 *Static error*: error which is caused by any reason and which stays unchanged in value during the operation of the system. This error should be measured under static conditions.

3.7 *Dynamic error*: error which is caused by dynamic influences acting on the system such as vibration, roll, pitch or linear acceleration. This error may have an amplitude and usually a frequency related to the environmental influences and the parameters of the system itself.

3.8 *Follow-up error*: error which is caused by the delay between the existence of a value to be sensed and the availability of the corresponding signal or data stream at the output of the system. This error is e.g. the difference between the real heading of turning vessel and the available information at the output of the system. The follow-up error disappears when the system is static.

4 OPERATIONAL REQUIREMENT

4.1 Functionality

4.1.1 The THD receives a heading signal and generates a suitable output signal for other devices.

4.1.2 Any sensor part may be included in the device.

4.1.3 Any correcting devices or parameters should be protected against inadvertent operation.

4.2 Presentation of information

4.2.1 All displays with the exception of the sensor, and all outputs of heading should indicate true heading.

4.2.2 Manually settable values used for electronic correction should be indicatable by adequate means.

4.3 Accuracy

4.3.1 The THD should be tested for accuracy with the sensing part connected. If the sensing part is so designed that it is included in the transmitting part, the equipment should be tested together with all parts.

4.3.2 The THD should meet at least the following accuracy at the output of the device under sea conditions as specified in resolution A.424(XI) or A.821(19) as applicable:

.1 Transmission and resolution errors. The transmission error including the resolution error should be less than ±0.2º;

.2 Static errors. The static errors should be less than ±1.0º;

.3 Dynamic errors.* The dynamic error amplitude should be less than ±1.5º. The dynamic error frequency should be less than 0.033Hz equivalent to a period not shorter than 30s if the amplitude of the dynamic error exceeds ±0.5º; and

.4 Follow-up error: The follow-up error for different rates of turn should be:

.4.1 less than ±0.5º at rates up to 10º/s; and

.4.2 less than ±1.5º between a rate of 10º/s and 20º/s.

4.4 **Interfacing**

At least one output should be in accordance with the relevant international marine interface standard.**

5 ELECTROMAGNETIC COMPATIBILITY

The device, with regard to electromagnetic interference and immunity, should, in addition to resolution A.694 (17),*** comply with resolution A.813 (19).****

6 FAILURE CONDITIONS

An alarm should be provided to indicate malfunctions of the THD or a failure of the power supply.

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* If the sensing part is a magnetic one it should meet resolution A.382(X) and should be tested separately in accordance with the relevant standard.

** Publication IEC 61162.

*** Publication IEC 60945.

**** Publication IEC 60533.

ANNEX 15

LIAISON STATEMENT FROM IMO TO ITU-R WORKING PARTY 8B

1 The IMO Sub-Committee on Safety of Navigation (NAV), at its forty-sixth session (10-14 July 2000), noted that a draft revision of Recommendation ITU-R M.1371 (Recommendation on the Technical Characteristics for a Universal Shipborne Automatic Identification System (AIS) using Time Division Multiple Access in the Maritime Mobile Band) is due to be considered by ITU Working Party 8B in October 2000.

2 The Sub-Committee wishes to inform the Working Party of the importance of the AIS to the safety of navigation, as reflected in the draft revised SOLAS chapter V, regulation V/19 on Carriage requirements for shipborne navigational systems and equipment and the operational guidelines for AIS, and thus to encourage the early and satisfactory completion of the revision of Recommendation ITU-R M.1371.

[Annex – Draft guidelines for the onboard operational use of shipborne automatic identification system (AIS) (see annex 18)]

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ANNEX 16

DRAFT ASSEMBLY RESOLUTION

STANDARD MARINE COMMUNICATION PHRASES

(Please see NAV 46/14/Add.1).

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ANNEX 17

DRAFT ASSEMBLY RESOLUTION ON GUIDELINES FOR THE RECORDING OF EVENTS RELATED TO NAVIGATION

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety;

RECALLING ALSO the provisions of regulation V/28 of the International Convention for the Safety of Life at Sea, 1974, requiring all ships engaged on international voyages to keep on board a record of navigational activities and incidents which are of importance to safety of navigation and which must contain sufficient detail to restore a complete record of the voyage, taking into account the recommendations adopted by the Organization;

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its seventy-third session;

1. ADOPTS the guidelines for the recording of events related to navigation set out in Annex to the present resolution;

2. INVITES Member Governments concerned to take into account these guidelines when implementing SOLAS regulation V/28.

3. REQUESTS the Maritime Safety Committee to keep the guidelines under review and amend them as appropriate.

ANNEX

GUIDELINES FOR THE RECORDING OF EVENTS RELATED TO NAVIGATION

Regulation V/28 of the SOLAS Convention 1974 requires all ships engaged on international voyages to keep on board a record of navigational activities and incidents which are of importance to safety of navigation and which must contain sufficient detail to restore a complete record of the voyage, taking into account the recommendations adopted by the Organization.

This resolution aims at providing guidance for the recording of such events:

1 Recording of events related to navigation

In addition to national requirements, the following events and items should, as appropriate, be among those recorded:

.1 Entries before commencing the voyage

(such as information on the ship's readiness to put to sea, proper manning and provisioning, cargo aboard, draught, result of stability checks, inspection of controls, steering gear, navigational and radiocommunication equipment)

.2 Entries during the voyage

(such as courses steered and distances sailed between waypoints, essential position fixings, winds, sea state, swell, currents, temperature and air pressure readings, changes to the voyage plan and position/time of pilot's embarkation/disembarkation)

.3 Entries on special events

(such as malfunctions of navigational and radiocommunication equipment, malfunctions of manoeuvring aids, distress messages received, reasons for not rendering assistance to vessels, aircraft or persons in distress, reasons for non-compliance with TSS, SRS, VTS, rest requirements under STCW regulation VIII/1, etc.)

.4 Entries when the ship is at anchor or in a port

(such as anchor-positions, scope of anchor chain(s), weather conditions, lights and shapes exhibited, confirmation of safety of berth, condition of lines and ropes, etc.)

2 Method of recording

Regulation V/28 of the SOLAS Convention 1974 requires that, if the records of navigational activities are not maintained in the ship's log-book, they should be

maintained in another form approved by the Administration. Methods of recording may be handwritten or electronic:

.1 handwritten in the bridge or navigational log;

.2 automatically be permanent recording facilities with input from voyage data recorder of an approved type;

.3 electronically in the ship's computer with back-up on floppy disk; and

.4 (……..).

3 Non-duplication

In general, information on the events and items in paragraph 1 adequately recorded in a special-purpose log, need not be duplicated in the ship's log book.

***

ANNEX 18

DRAFT GUIDELINES FOR THE ONBOARD OPERATIONAL USE OF SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEMS (AIS)

1 Purpose of this Document

The purpose of this document is to promote the most effective use of and to create justified confidence in shipborne Automatic Identification Systems (AIS) onboard ships. The Guidelines have been written specifically to inform mariners about AIS, and to explain how and when AIS can be safely used on the bridge of a ship.

AIS should be operated taking into account these guidelines.

AIS equipment is available from a number of manufacturers and many software applications are possible.

The user should be familiar with the AIS in order to become competent in the use of the system and of the displayed data for safe navigation. However, this document does not release the user from the duty to be familiar with the "ship - specific" equipment and the manufacturer's manuals.

WARNING

The Officer of the watch (OOW) should always be aware that other ships, and in particular leisure craft, fishing boats and warships, and some coastal shore stations including Vessel Traffic Service (VTS) centres might not be fitted with AIS.

The OOW should always be aware that other ships fitted with AIS as a mandatory carriage requirement, might switch off AIS by professional judgement of the master.

In SOLAS regulation V/19 mandatory carriage requirements for AIS are defined as shown in Annex 1.

2 Objectives of AIS

The proper use of AIS contributes to and enhances the safety of life at sea, the safety and efficiency of navigation and the protection of the marine environment.

According to draft SOLAS chapter V, Regulation 19

"*AIS shall:*

- *provide automatically to appropriately equipped shore stations, other ships and aircraft information, including the ship's identity, type, position, course, speed, navigational status and other safety-related information;*

- *receive automatically such information from similarly fitted ships;*

- *monitor and track ships; and*

- *exchange data with shore-based facilities."*

Thus AIS will become an important supplement to existing navigational systems including radar. In general data received via AIS will enhance the quality of the information available to the OOW. AIS is an important tool to enhance situational awareness of the traffic situation to all users

In particular, the purpose of AIS is:

- to identify vessels;
- to assist target tracking;
- to simplify information exchange;
- to provide additional information to assist collision avoidance; and
- to reduce verbal mandatory ship reporting.

3 Description of AIS

3.1 General

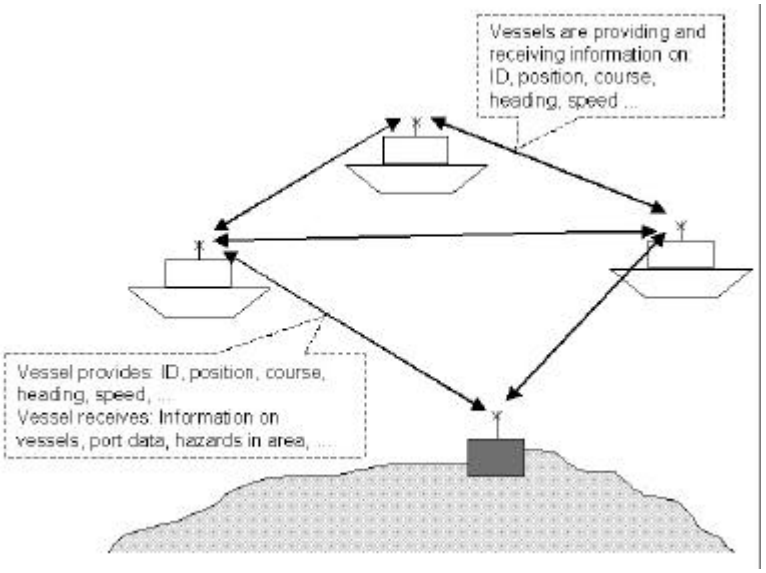

Figure 1 AIS system overview

Shipborne AIS

- continuously transmits ship's own data to other vessels and VTS stations,
- continuously receives data of other vessels and VTS stations, and
- displays this data.

When used with the appropriate graphical display, shipborne AIS enables provision of fast, automatic and accurate information regarding risk of collision by calculating Closest Point of Approach (CPA) & Time to Closest Point of Approach (TCPA) from the position information transmitted by the target vessels.

AIS operates primarily on two dedicated VHF channels. Where these channels are not available regionally, the AIS is capable of automatically switching to designated alternate channels.

In practice the capacity of the system is unlimited allowing for a great number of ships to be accommodated at the same time.

The AIS is able to "see" around bends and behind islands if the landmasses are not too high. A typical value to be expected at sea is 20 to 30 nautical miles depending on antenna height. With the help of repeater stations the coverage for both ship and VTS stations can be improved.

Information from an operational shipborne AIS is transmitted continuously and automatically without any intervention or knowledge of the OOW. An AIS shore station might want updated information from a specific ship, or alternatively, might want to "poll" all ships within a defined sea area.

3.2 Components

In general the AIS on board (see figure 1) consists of:

- antennas;
- one VHF transmitter;
- two multi-channel VHF receivers;
- one channel 70 VHF receiver for channel management;
- a central processing unit (CPU);
- an electronic position fixing system, Global Navigation Satellite System GNSS receiver for timing purposes and position redundancy;
- interfaces to heading and speed devices and to other shipborne sensors;
- interfaces to radar/Automatic Radar Plotting Aids (ARPA), Electronic Chart System/Electronic Chart Display and Information System (ECS/ECDIS) and integrated navigation systems;
- BIIT (Built In Integrity Test); and
- minimum display and keyboard to input and retrieve data.

With the integral minimum display and keyboard unit, the AIS would be able to be operated as a stand-alone system. A stand alone graphical display or the integration of the AIS data display into other devices such as Integrated Navigation System (INS), ECS/ECDIS or a radar/ARPA display would significantly increase the effectiveness of AIS, when achievable.

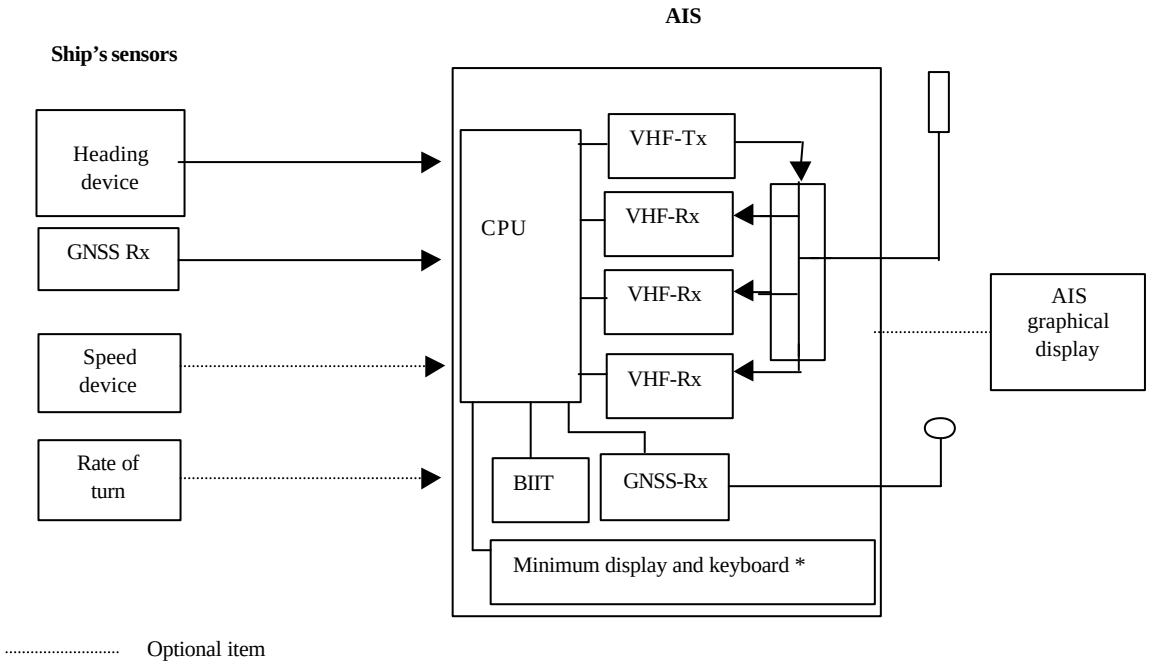

Figure 1 - AIS Components

3.3 Connections

3.3.1 The connection of AIS to external navigational display systems

The AIS can be connected either to an additional dedicated AIS display unit, and possibly one with a large graphic display, or to an existing navigational system such as radar or an electronic chart but in the later case only as part of an integrated navigation system.

3.3.2 The connection of AIS to external portable navigational equipment

It is becoming common practice for pilots to possess their own portable navigational equipment, which they carry on board. Such devices can be connected to shipborne AIS equipment and display the targets they receive.

3.3.3 The connection of AIS to external long-range radiocommunication devices

3.3.3.1 AIS is provided with a two-way interface for connecting to long range radiocommunication equipment. Initially, it is not envisaged that AIS would be able to be directly connected to such equipment.

3.3.3.2 A shore station would first need to request that the ship makes a long range AIS information transmission. Any ship-to-shore communication would always be made point-to-point, and not broadcast, and once communication had been established, the ship would have the option of setting its AIS to respond automatically to any subsequent request for a ship report, from that shore station.

3.3.3.3 Ships are reminded that under regulation 11.11 of SOLAS chapter V, as amended, the participation of ships in IMO-adopted ship reporting systems should be free of charge to the ships concerned.

4 AIS Information

4.1 Data sent by ships

4.1.1 Ship's data content

The AIS information transmitted by a ship includes three different types of information: (i) fixed, or static information that is entered into the AIS on installation and need only be changed if the ship changes its name or undergoes a major conversion from one ship type to another; (ii) dynamic information that in general is automatically updated from the ship sensors connected to AIS; and (iii) voyage related information that might need to be manually entered and updated during the voyage.

Details are given in table 1 below:

Information item	**Information generation, type and quality of information**
Static:	
MMSI	Maritime Mobile Service Identity Set on installation Note that this might need amending if the ship changes ownership
Call sign and name	Set on installation Note that this might need amending if the ship changes ownership
IMO Number	Set on installation
Length and beam	Set on installation or if changed
Type of ship	Select from pre-installed list
Location of position fixing antenna	Set on installation or may be changed for bi-directional vessels or those fitted with multiple antennae

Dynamic:	
Ship's position with accuracy indication and integrity status	Automatically updated from the position sensor connected to AIS. The accuracy indication is for better or worse than 10 m.
Position Time stamp in UTC	Automatically updated from ship's main position sensor connected to AIS.
Course over ground (COG)	Automatically updated from ship's main position sensor connected to AIS, if that sensor calculates COG. This information might not be available.
Speed over ground (SOG)	Automatically updated from the position sensor connected to AIS. This information might not be available.
Heading	Automatically updated from the ship's heading sensor connected to AIS.
Navigational status	Navigational status information has to be manually entered by the OOW and changed, as necessary, for example: - underway by engines - at anchor - not under command (NUC) - restricted in ability to manoeuvre (RIATM) - moored - constrained by draught - aground - engaged in fishing - underway by sail

	In practice, since all these relate to the COLREGS, any change that is needed could be undertaken at the same time that the lights or shapes were changed.
Rate of turn (ROT)	Automatically updated from the ship's ROT sensor or derived from the gyro. This information might not be available.

Voyage related:	
Ship's draught	To be manually entered at the start of the voyage using the maximum draft for the voyage and amended as required. e.g. – result of de-ballasting prior to port entry.
Hazardous cargo (type)	To be manually entered at the start of the voyage confirming whether or not hazardous cargo is being carried, namely: DG Dangerous goods HS Harmful substances MP Marine pollutants Indications of quantities are not required.
Destination and ETA	To be manually entered at the start of the voyage and kept up to date as necessary.
Route plan (waypoints)	To be manually entered at the start of the voyage, at the discretion of the master and updated when required.

Short safety-related messages:	
	Free format short text messages would be manually entered, addressed either a specific addressee or broadcast to all ships and shore stations.

Table 1 Data sent by ship

The data is autonomously sent at different update rates:

- dynamic information dependent on speed and course alteration (see Table 2),
- static and voyage related data every 6 minutes or on request (responds automatically without user action).

Type of ship	**Reporting interval**
Ship at anchor	3 min
Ship 0-14 knots	12 sec
Ship 0-14 knots and changing course	4 sec
Ship 14-23 knots	6 sec
Ship 14-23 knots and changing course	2 sec
Ship >23 knots	3 sec
Ship >23 knots and changing course	2 sec

Table 2: Report Rate of Dynamic Information

4.1.2 Short safety related messages

Short safety related messages are fixed or free format text messages addressed either to a specified destination (MMSI) or all ships in the area. Their content should be relevant to the safety of navigation, e.g. an iceberg sighted or a buoy not on station. Messages should be kept as short as possible. The system allows up to 158 characters per message but the shorter the message the easier it will find free space for transmission. At the moment these messages are not further regulated, to keep all possibilities open.

Operator acknowledgement may be requested by a text message.

Short safety related messages are only an additional means to broadcast maritime safety information. Whilst their importance should not be underestimated, the usage of such short safety related message does not remove any of the requirements of the Global Maritime Distress Safety System (GMDSS).

The operator should ensure that he displays and considers incoming safety related messages and should send safety related messages as required.

According to draft SOLAS chapter V, Regulation 31 (Danger messages)

> *"The master of every ship which meets with dangerous ice, a dangerous derelict, or any other direct danger to navigation, or ...is bound to communicate the information by all the means at his disposal to ships at his vicinity, and also to the competent authorities..."*

Normally this is done via VHF voice communication, but "by all the means" now implies the additional use of the AIS short messages application, which has the big advantage to reduce difficulties in understanding, especially when noting down the correct position.

4.1.3 Confidentiality

When entering any data manually consideration should be given to confidentiality of this information, especially when international agreements, rules or standards provide for the protection of navigational information.

4.2 Content of data sent by VTS

4.2.1 Pseudo AIS information

VTS centres may send information about vessels which are not carrying AIS and which are tracked only by VTS radar, via the AIS to vessels equipped with AIS. Any pseudo AIS target broadcast by VTS should be clearly identified as such. Particular care should always be taken when using information that has been relayed by a third party. Accuracy of these targets may not be as accurate as actual directly received targets and the information content may not be as complete.

4.2.2 Text messages

VTS centres may also send short messages either to one ship, all ships or ships within a certain range or in a special area, e.g.:

- (local) navigational warnings;
- traffic management information; and
- port management information.

A VTS operator may request by a text message an acknowledgement from the ship's operator.

Note: The VTS will continue to communicate via VHF. The importance of verbal communication should not be underestimated. This is important for the VTS operator to:

- assess the vessels communicative ability; and
- establish the direct communication link which could be needed in critical situations.

4.2.3 (D)GNSS corrections

(D)GNSS corrections may be sent by VTS centres via AIS.

4.3 Type and quality of data

All onboard sensors have to comply with the relevant IMO performance standards concerning availability, accuracy, discrimination, up-date rates, status and failure alarms and interfacing.

4.4 Integrity Check

AIS provides:

- a built in integrity test (BIIT) running continuously or at appropriate intervals;
- monitoring the availability of the data;
- an error detection mechanism of the transmitted data; and
- error checking of the received data.

If no sensor is installed or if the sensor (*e.g.* the gyro) fails to provide data, the AIS automatically transmits the "not available" data value.

However the integrity check cannot validate the contents of the data processed by the AIS.

5 Operation of AIS on board

5.1 Operation of the transceiver unit

5.1.1 Activation

AIS should always be in operation. It is recommended not to switch off AIS during port stays, because of the valuable information to port authorities. If the master believes that the continual operation of AIS might compromise the safety or security of his ship, he may switch off the AIS. The master should however restart the AIS as soon as the source of danger has disappeared. This might be the case in sea areas where pirates and armed robbers are known to operate. Actions of this nature should always be recorded in the ship's logbook. If the AIS is shut-down static data and voyage related information remains stored. Restart is done by switching on the power to the AIS unit. Ship's own data will be transmitted after a two minute initialization period.

5.1.2 Manual input of data

The OOW should manually input at the start of the voyage and whenever changes occur the following information using the input device such as a keyboard:

- Ship's draught;
- hazardous cargo;
- destination and ETA;
- route plan (way-points);
- the correct and actual navigational status; and
- safety related short messages

5.1.3 Check of information

To ensure that static information is correct and up-to-date, the OOW should check the data whenever there is a reason for it. As a minimum this should be done once per voyage or once per month whichever is shorter. The data may be changed only by the master or by an authorized person.

The OOW should also check the following dynamic information:

- ensure that positions are given according to WGS 84;
- ensure that the speed over ground is provided; and
- verify the sensor information periodically.

After activation an automatic built in integrity test (BIIT) is performed. In case of any AIS malfunction an alarm is provided and the unit stops transmitting.

The quality or accuracy of the ship sensor data input into AIS would not however be checked by the BIIT circuitry before being broadcasted to other ships and shore stations. The ship should therefore carry out regular routine checks during a voyage to validate the quality of the information being transmitted, and the frequency of those checks would need to be increased in coastal waters.

5.2 Display of AIS data

The AIS provides data that can be presented on the minimum display or on any suitable display device as described in section 3.3.

5.2.1 Minimum display

The display provides three lines of data. Each line displays at least bearing, range and name of a selected ship. Other data of the ship can be displayed by horizontal scrolling of data, but scrolling of bearing and range is not possible. Vertical scrolling will show all the other ships known to the AIS.

5.2.2 Graphical display

If the AIS information is presented graphically it should ideally be consistent and should consist of the following:

Sleeping target A sleeping target indicates only the presence of a vessel equipped with AIS in a certain location. No additional information is presented until activated thus avoiding information overload.

Activated target If the user wants to know more about a vessels motion, he has simply to activate the target (sleeping), such that the display shows immediately:

- a vector (speed and course over ground),
- ROT indication (if available) to display actually initiated course changes, and
- the heading.

Selected target If the user wants detailed information of a target (activated or sleeping), he may select it. Then, the data received as well as the calculated CPA and TCPA values will be shown in an alpha-numeric window.
The special navigation status will also be indicated in the alpha numeric data field and not together with the target directly.

Dangerous target If an AIS target (activated or not) is calculated to pass pre-set CPA and TCPA limits, it will be classified and displayed as a dangerous target and an alarm will be given.

Lost target If an AIS signal of any AIS target at a distance of less than a preset value is not received, a lost target symbol will appear at the latest position and an alarm is given.

5.2.2 Symbols

The user should be familiar with the symbology used in the graphical display provided.

6 Inherent limitations of AIS

6.1 The Officer of the watch (OOW) should always be aware that other ships, and in particular leisure craft, fishing boats and warships, and some coastal shore stations including Vessel Traffic Service (VTS) centres might not be fitted with AIS.

6.2 The OOW should always be aware that other ships fitted with AIS as a mandatory carriage requirement, might switch off AIS by professional judgement of the master.

6.3 In other words, the information given by the AIS may not be a complete picture of the situation around the ship.

6.4 The users must be aware that transmission of erroneous information implies a risk to other ships as well as their own. The users remain responsible for all information entered into the system and the information added by the sensors.

6.5 The accuracy of AIS information received is only as good as the accuracy of the AIS information transmitted.

6.6 The OOW should be aware that poorly configured or calibrated ship sensors (position, speed and heading sensors) might lead to incorrect information being transmitted. Incorrect information about one ship displayed on the bridge of another could be dangerously confusing.

6.7 It would be prudent for the OOW not to assume that the information received from other ships is of a comparable quality and accuracy as that which might be available on own ship.

7 Use of AIS

7.1 When using the AIS in the ship to ship mode for anti collision purposes, the OOW should carefully note the information in the ensuing paragraphs:

7.2 AIS is an additional source for navigational information. AIS does not replace, but supports navigational systems such as radar target tracking and VTS.

7.3 The use of AIS does not negate the responsibility of the OOW to comply with all COLREG requirements, in particular maintaining a proper look-out, proceeding at a safe speed and radar observation.

7.4 In general, AIS tracking is:

- highly accurate;
- provided in near real – time;
- capable of instant presentation of target course alterations;

- not subject to target swap;
- not subject to target loss in clutter;
- not subject to target loss due to fast manoeuvres; and
- able to look around bends and behind islands.

However, the user should not rely on AIS as the sole information system. He has to use all safety-relevant information available.

7.5 AIS is just one of a number of aids to safe navigation available to the OOW. The presence on board of AIS should not have any special impact on the composition of the navigational watch, which should be determined in accordance with the STCW Code.

7.6 When assessing the navigational situation without AIS, the OOW appraises other ships or targets relative to own ship. AIS information is geographically-based (ground stabilised) and represents the actual navigational movement of a ship in near-real time. Care should therefore be taken when attempting to match AIS information with that which has been observed from the ship, either visually or by radar.

7.7 Once a ship has been detected, AIS can assist in tracking it as a target. By monitoring the information broadcast by that target, its actions can also be readily monitored. Changes in heading and course are, for example, immediately apparent, and many of the problems common to tracking targets by radar, namely clutter, target swap as ships pass close by and target loss following a fast manoeuvre, do not affect AIS.

7.8 AIS can also assist in the identification of targets, by name or call sign and by ship type and navigational status. The ability to identify targets should not, however, encourage ship to use VHF to resolve collision situations. Further, ships should not agree to collision avoidance actions that contravene the rules contained in the Convention on the International Regulations for Preventing Collisions at Sea, 1972, as amended (COLREGS). Complying with the COLREGS should not necessitate the use of VHF, or any other means of ship-to-ship communication, other than the display of appropriate lights and shapes. Indeed, resorting to verbal VHF communications might lead to language misinterpretations and should, as far as possible, be avoided.

7.9 In developing close-quarter situations, the availability of AIS information should also not encourage any ship to stand-on for longer than would be usual where only visual or radar observations are available. Early and substantial action to keep well clear of another vessel, as required by the COLREGS should always be taken.

7.10 AIS may calculate collision avoidance parameters such as CPA and TCPA. The OOW should be aware that such parameters calculated by AIS might differ to those calculated by radar, for the same target.

7.11 When using radar to match AIS and radar targets, it is important to switch the radar to ground stabilised mode to compare radar and AIS target vectors.

8 Additional and future applications

8.1 AIS in SAR operations

To some extent AIS is already used in search and rescue operations, especially in combined helicopter and surface searches. AIS enables the direct presentation of the position of the vessel in distress on other displays such as Radar or ECS/ECDIS, which facilitates the task of SAR crafts. It would be desirable to present the vessel in distress with a special symbol. For distressed vessels not equipped with AIS, the On Scene Commander (OSC) could create a pseudo AIS target as far as practicable.

8.2 Aids to navigation

AIS, when fitted to selected fixed and floating aids to navigation can provide information to the mariner such as

- Position;
- Status;
- tidal and current data; and
- weather and visibility conditions.

8.3 AIS in an overall information system

AIS will play a role in an overall international maritime information system, supporting voyage planning and monitoring. This will assist administrations to monitor all the vessels in their areas of concern and track dangerous cargo.

9 Reference documents

IMO Recommendation on Performance Standards for a Universal Automatic Identification System (AIS), (MSC. 74(69))

IMO SOLAS Convention Chapter V [2002]

ITU Radio Regulations, Appendix S18, Table of Transmitting Frequencies in the VHF Maritime Mobile Band

ITU Recommendation on the Technical Characteristics for a Universal Shipborne Automatic Identification System (AIS) Using Time Division Multiple Access in the Maritime Mobile Band (ITU-R M.1371)

IEC Standard 61993 Part 2: Universal Shipborne Automatic Identification System (AIS) Operational and Performance Requirements, Methods of testing and required test Results.

ANNEX 1

Carriage Requirements

In the proposed SOLAS V (Regulation 19) the AIS carriage requirements are defined:

> *"All ships of 300 gross tonnage and upwards engaged on international voyages and cargo ships of 500 gross tonnage and upwards not engaged on international voyages and passenger ships, irrespective of size, shall be fitted with AIS, as follows:*
>
> - *ships constructed on or after [1 July 2002]*
>
> - *ships engaged on international voyages constructed before [1 July 2002]*
>
> *.1 in the case of passenger ships and tankers not later than [1 July 2003]*
>
> *.2 in the case of ships, other than tankers, of 50.000 gross tonnage and upwards not later than [1 July 2004]*
>
> *.3 in the case of ships, other than tankers, of 10.000 gross tonnage and upwards but less than 50.000 gross tonnage, not later than [1 July 2005]*
>
> *.4 in the case of ships, other than tankers, of 3.000 gross tonnage and upwards but less than 10.000 gross tonnage, not later than [1 July 2006]*
>
> *.5 in the case of ships, other than tankers, of 300 gross tonnage and upwards but less than 3.000 gross tonnage, not later than [1 July 2007]*
>
> - *ships not engaged on international voyages constructed before [1 July 2002], not later than [1 July 2008]"*

The administrations may exempt ships from the application of the requirements for AIS when such ships will be taken permanently out of service within two years after the implementation dates specified above.

The user must be aware of the fact that he might encounter vessels, which are not equipped with AIS particularly small ships, pleasure craft and military ships.

ANNEX 2

Technical description

AIS operates primarily on two dedicated VHF channels (AIS1 - 161,975 MHz and AIS2 - 162,025 MHz). Where these channels are not available regionally, the AIS is capable of automatically switching to alternate designated channels.

The required ship reporting capacity according to the IMO performance standard amounts to a minimum of 2000 time slots per minute (see fig. 1). The ITU Technical standard for the Universal AIS provides 4500 time slots per minute. The broadcast mode based on a principle called (S)TDMA (Self-organized Time Division Multiple Access) that allows the system to be overloaded with 400 to 500 % and still provides nearly 100% throughput for ships closer than 8 to 10 NM to each other in a ship to ship mode. In the event of system overload, only targets far away will be subject to drop out in order to give preference to targets close by, that are a primary concern for ship-to-ship operation of AIS. In practice the capacity of the system is unlimited allowing for a great number of ships to be accommodated at the same time.

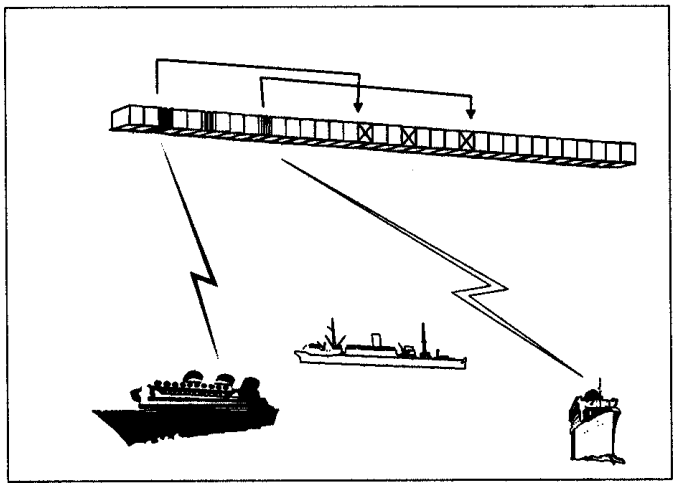

Figure 1- Principles of TDMA

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ANNEX 19

DRAFT AMENDMENTS TO SOLAS CHAPTER X

Regulation 3 - Requirements for high-speed craft

"1 Notwithstanding the provisions of chapters I to IV and regulations ~~[V/12]~~ V/18, V/19 and V/20

.1 a high-speed craft constructed on or after 1 January 1996 but before [1 July 2002] which complies with the requirements of the High-Speed Craft Code, 1994 in its entirety and which has been surveyed and certified as provided in that Code shall be deemed to have complied with the requirements of chapters I to IV and regulations ~~[V/12]~~ V/18, V/19 and V/20. For the purpose of this regulation, the requirements of that Code shall be treated as mandatory.

.2 a high-speed craft constructed on or after [1 July 2002] which complies with the requirements of the High-Speed Craft Code, 2000 in its entirety and which has been surveyed and certified as provided in that Code shall be deemed to have complied with the requirements of chapters I to IV and regulations ~~[V/12]~~ V/18, V/19 and V/20"

***

Note: Strikeout text shows proposed deletions and shaded text indicates proposed additions.

ANNEX 20

DRAFT AMENDMENTS TO CHAPTER 13 OF THE HSC CODE, 2000

CHAPTER 13

SHIPBORNE NAVIGATIONAL SYSTEMS AND EQUIPMENT AND VOYAGE DATA RECORDER*

13.1 General

13.1.1 This chapter ~~only~~ covers ~~items of navigational~~ equipment which relate to the navigation of the craft as distinct from the safe functioning of the craft. The following paragraphs ~~represent~~ set out the minimum requirements for high-speed craft ~~normal safe navigation unless it is demonstrated to the Administration that an equivalent level of safety is achieved by other means~~.

13.1.2 The ~~navigational~~ equipment and its installation shall be to the satisfaction of the Administration.

13.1.3 The information provided by navigational systems and equipment shall be so displayed that the probability of misreading is reduced to a minimum and shall be capable of giving readings to an optimum accuracy.

13.2 Compasses

13.2.1 Craft shall be provided with a magnetic compass which is capable of operating without electrical supply, and which may be used for steering purposes. This compass shall be mounted in a suitable binnacle containing the required correcting devices and shall be suitable for the speed and motion characteristics of the craft.

13.2.2 The compass card or repeater shall be capable of being easily read from the position at which the craft is normally controlled.

13.2.3 Each magnetic compass shall be properly adjusted and its table or curve of residual deviations shall be available at all times.

13.2.4 Care shall be taken in siting a magnetic compass or magnetic sensing element so that magnetic interference is eliminated or minimized as far as is practicable.

13.2.5 Passenger craft certified to carry 100 passengers or less shall, in addition to the compass required by 13.2.1, be provided with ~~an electromagnetic compass including rate gyro~~ a properly adjusted transmitting heading device, suitable for the speed and motion characteristics and area of operation of the craft, capable of transmitting a true heading reference to other equipment.

13.2.6 ~~Cargo craft and~~ ~~p~~Passenger craft certified to carry more than 100 passengers and cargo craft shall, in addition to the compass required in 13.2.1, be provided with a gyro-compass which shall be suitable for the speed and motion characteristics and area of operation of the craft.

Note: Strikeout text shows proposed deletions and shaded text indicates proposed additions.

* According to regulation X/3.1.2 of the 1974 SOLAS Convention, the provisions of chapter V of the Convention also apply to high speed craft, with the exception of those of regulations V/18, V/19 and V/20.

13.3 Speed and distance measurement

13.3.1 Craft shall be provided with a device ~~to measure~~ capable of indicating speed and distance~~, except when no device is available which will function reliably at all speeds at which the craft may operate~~.

13.3.2 Speed- and distance-measuring devices on craft fitted with an ~~a~~Automatic ~~r~~Radar ~~p~~Plotting ~~a~~Aid (ARPA) ~~and~~ or ~~a~~Automatic ~~t~~Tracking ~~a~~Aid (ATA) shall be capable of measuring speed and distance through the water.

13.4 Echo-sounding device

13.4.1 Non-amphibious craft shall be ~~fitted~~ provided with an echo-sounding device which will give an indication of depth of water to a sufficient degree of accuracy for use when the craft is in the displacement mode.

13.5 Radar installations

13.5.1 Craft shall be provided with at least one azimuth-stabilized radar operating ~~in the X band~~ on 9 GHz (3 cm).

13.5.2 Craft of 500 gross tonnage and upwards or craft certified to carry more than 450 passengers shall also be provided with ~~at least two radar installations, each being capable of being operated independently of the other~~ a 3 GHz (10 cm) radar or where considered appropriate by the Administration a second 9 GHz radar, or other means to determine and display the range and bearing of other surface craft, obstructions, buoys, shorelines and navigational marks to assist in navigation and in collision avoidance, which are functionally independent of those referred to in paragraph 13.5.1. ~~A second radar may also be provided in craft of less than 500 gross tonnage or certified to carry 450 passengers or less where environmental conditions so require~~.

13.5.3 At least one radar shall be provided with facilities for an ARPA or ATA suitable for the motion and speed of the craft.

13.5.4 Adequate communication facilities shall be provided between the radar observer and the person in immediate charge of the craft.

13.5.5 Each radar installation provided shall be suitable for the intended craft speed, motion characteristics and commonly encountered environmental conditions.

13.5.6 Each radar installation shall be mounted so as to be as free as practicable from vibration.

13.6 Electronic positioning systems

~~Where the area of operation of a high speed craft is covered by a reliable electronic position-fixing system, the craft shall be provided with the means to fix its position using such system.~~ Craft shall be provided with a receiver for a global navigation satellite system or a terrestrial

radionavigation system, or other means, suitable for use at all times throughout the intended voyage to establish and update the ship's position by automatic means.

13.7 Rate-of-turn indicator and rudder angle indicator

13.7.1 Craft of 500 gross tonnage or upwards shall ~~have~~ be provided with a rate-of-turn indicator. A rate-of-turn indicator shall be provided in craft of less than 500 gross tonnage if the test according to annex 9 shows that the turn rate can exceed safety level 1.

13.7.2 Craft shall be provided with an indicator showing the rudder angle. In craft without a rudder, the indicator shall show the direction of steering thrust.

13.8 ~~Other navigational aids~~ Nautical charts and nautical publications

~~**13.8.1** The information provided by navigational systems shall be so displayed that the probability of misreading is reduced to a minimum and shall be capable of giving readings to an optimum accuracy.~~

13.8.1 Craft shall be provided with nautical charts and nautical publications to plan and display the ship's route for the intended voyage and to plot and monitor positions throughout the voyage; an Electronic Chart Display and Information System (ECDIS) may be accepted as meeting the chart carriage requirements of this paragraph.

13.8.2 Back-up arrangements shall be provided to meet the functional requirements of paragraph 13.8.1, if this function is partly or fully fulfilled by electronic means.*

13.9 Searchlight and daylight signalling lamp

13.9.1 Craft shall be ~~equipped~~ provided with at least one adequate searchlight, which shall be controllable from the operating station.

13.9.2 One portable daylight signalling lamp ~~capable of operating independently of the craft's main electrical supply~~ shall be provided and maintained ready for use in the operating compartment at all times.

13.10 Night vision equipment

13.10.1 When operational conditions justify the provision of night vision ~~enhancement~~ equipment, such equipment shall be ~~fitted~~ provided.

13.11 Steering arrangement and propulsion indicator(s)

13.11.1 The steering arrangement shall be so designed that the craft turns in the same direction as that of the wheel, tiller, joystick or control lever.

* An appropriate folio of paper nautical charts may be used as a back-up arrangement for ECDIS. Other back-up arrangements for ECDIS are acceptable (see appendix 6 to resolution A.817(19), as amended).

13.11.2 Craft shall be provided with ~~indicators~~ means to show~~ing~~ the mode of the propulsion system(s).

13.11.3 Craft with emergency steering positions shall be provided with arrangements for supplying visual compass readings to the emergency steering position.

13.12 Automatic steering aid (automatic pilot ~~equipment~~)

13.12.1 Craft shall~~, where possible,~~ be ~~equipped~~ provided with an automatic steering aid (automatic pilot) ~~equipment~~.

13.12.2 Provision shall be made to change from the automatic to manual mode by a manual override.

13.13 Radar reflector

If practicable, craft of 150 gross tonnage or below shall be provided with a radar reflector, or other means, to assist detection by ships navigating by radar at both 9 and 3 GHz.

13.14 Sound reception system

When the craft's bridge is totally enclosed and unless the Administration determines otherwise, craft shall be provided with a sound reception system, or other means, to enable the officer in charge of the navigational watch to hear sound signals and determine their direction.

13.15 Automatic Identification System (AIS)

13.15.1 Craft shall be provided with Automatic Identification System (AIS).

13.15.2 AIS shall:

.1 provide automatically to appropriately equipped shore stations, other vessels and aircraft information, including the vessel's identity, type, position, course, speed, navigational status and other safety-related information;

.2 receive automatically such information from similarly fitted vessels;

.3 monitor and track vessels; and

.4 exchange data with shore based facilities.

13.15.3 The requirements of paragraph 13.15.2 shall not be applied to cases where international agreements, rules or standards provide for the protection of navigational information.

13.15.4 AIS shall be operated taking into account the guidelines adopted by the Organization.[*]

[*] Refer to resolution … - Guidelines on the operation of AIS on ships (to be developed before this regulation enters into force).

13.16 Voyage Data Recorders (VDR)

13.16.1 To assist in casualty investigations, passenger craft irrespective of its size and cargo craft of 3,000 gross tonnage and upwards shall be provided with a Voyage Data Recorder (VDR).

13.16.2 The voyage data recorder (VDR) system, including all sensors, shall be subjected to an annual performance test. The test shall be conducted by an approved testing or servicing facility to verify the accuracy, duration and recoverability of the recorded data. In addition, tests and inspections shall be conducted to determine the serviceability of all protective enclosures and devices fitted to aid location. A copy of a certificate of compliance issued by the testing facility stating the date of compliance and the applicable performance standards, shall be retained on board the craft.

13.~~13~~17 Approval of systems and equipment, and ~~P~~performance standards

13.~~13~~17.1 All equipment to which this chapter applies shall be of a type approved by the Administration. ~~Subject to 13.13.2, s~~Such equipment shall conform to performance standards not inferior to those adopted by the Organization[*].

[*] Recommendation on performance standards for magnetic compasses (resolution A.382(X));
Recommendation on performance standards for marine transmitting magnetic heading devices (TMHDs) (resolution MSC.86(70), annex 2);
Recommendation on performance standards for Gyro-compasses for high-speed craft (resolution A.821(19);
Recommendation on performance standards for devices to indicate speed and distance (resolution A.824(19), [as amended];
Recommendation on performance standards for echo-sounding equipment (resolution A.224(VII) as amended by MSC.74(69), annex 2);
Recommendation on performance standards for navigational radar equipment for high-speed craft (resolution A.820(19));
Recommendation on performance standards for "Auto Tracking" (resolution MSC.64(67), annex 4, appendix 1);
~~Recommendation on performance standards for shipborne Decca navigator receivers (resolution A.816(19));~~
Recommendation on performance standards for shipborne Loran-C and Chayka receivers (resolution A.818(19));
Recommendation on performance standards for shipborne global positioning system receiver equipment (resolution A.819(19));
Recommendation on performance standards for shipborne GLONASS receiver equipment (resolution MSC.53(66));
Recommendation on performance standards for shipborne DGPS and DGLONASS maritime radio beacon receiver equipment (resolution MSC.64(67), annex 2);
Recommendation on performance standards for combined GPS/GLONASS receiver equipment (resolution MSC.74(69), annex 1);
Performance standards for rate-of-turn indicators (resolution A.526(13));
Recommendation on performance standards for night vision equipment for high-speed craft (resolution MSC.94(72));
Recommendation on performance standards for daylight signalling lamps (resolution MSC.95(72)); ~~and~~
Recommendation on performance standards for automatic steering aids (automatic pilots) for high-speed craft (resolution A.822(19))~~.~~;
Recommendation on performance standards for sound reception systems (resolution MSC.86(70), annex 1);
Recommendation on performance standards for voyage data recorders (VDRs) (resolution A.861(20));
Recommendation on performance standards for electronic chart display and information systems (ECDISs) (resolution A.817(19), as amended by resolution MSC.86(70), annex 4);
Recommendation on performance standards for automatic radar plotting aids (resolution A.823(19);
Recommendation on performance standards for a universal shipborne automatic identification system (AIS) (resolution MSC.74(69), annex 3);
Recommendation on performance standards for radar reflectors (resolution A.384(X)); and
[Recommendation on performance standards for marine transmitting heading devices (THDs) (resolution MSC…(…))].

~~**13.13.2** Equipment installed before the adoption of performance standards by the Organization may be exempted from full compliance with the performance standards having due regard to the criteria which the Organization may adopt in connection with such standards.~~

13.17.2 The Administration shall require that the manufacturers have a quality control system audited by a competent authority to ensure continuous compliance with the type approval conditions. Alternatively, the Administration may use final product verification procedures where the compliance with the type approval certificate is verified by a competent authority before the product is installed on board craft.

13.17.3 Before giving approval to navigational systems or equipment embodying new features not covered by this chapter, the Administration shall ensure that such features support function at least as effective as those required by this chapter.

13.17.4 When equipment for which performance standards have been developed by the Organization, is carried on craft subject to the carriage requirements under this chapter in addition to those items of equipment required by this chapter, such additional equipment shall be subject to approval and shall as far as practicable comply with performance standards not inferior to those adopted by the Organization.

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ANNEX 21

DRAFT AMENDMENTS TO CHAPTER 13 OF THE HSC CODE, 1994

1 The title of chapter 13 should be amended as follows:

"Chapter 13

SHIPBORNE NAVIGATIONAL SYSTEMS AND EQUIPMENT AND VOYAGE DATA RECORDER[*]"

2 The existing paragraph 13.1 should be amended as follows:

"13.1 General

13.1.1 This chapter ~~only~~ covers ~~items of navigational~~ equipment which relate to the navigation of the craft as distinct from the safe functioning of the craft. The following paragraphs represent the minimum requirements for normal safe navigation unless it is demonstrated to the Administration that an equivalent level of safety is achieved by other means.

13.1.2 The ~~navigational~~ equipment and its installation should be to the satisfaction of the Administration."

3 The following new paragraph should be added after the existing paragraph 13.12:

"**13.13 Voyage Data Recorders (VDR)**[**]

13.13.1 To assist in casualty investigations, passenger craft other than ro-ro passenger craft constructed before 1 July 2002 should be fitted with a Voyage Data Recorder (VDR) not later than [1 January 2004].

13.13.2 The voyage data recorder (VDR) system, including all sensors, should be subjected to an annual performance test. The test should be conducted by an approved testing or servicing facility to verify the accuracy, duration and recoverability of the recorded data. In addition, tests and inspections should be conducted to determine the serviceability of all protective enclosures and devices fitted to aid location. A copy of a certificate of compliance issued by the testing facility stating the date of compliance and the applicable performance standards, should be retained on board the ship."

4 The existing paragraph 13.13 should be re-numbered as new paragraph 13.14.

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[*] According to regulation X/3.1.1 of the 1974 SOLAS Convention, the provisions of chapter V of the Convention also apply to high speed craft, with the exception of those of regulations V/18, V/19 and V/20.

[**] Refer to resolution A.861(20) – Recommendation on Performance Standards for Voyage Data Recorders (VDRs).

ANNEX 22

REVISED WORK PROGRAMME OF THE SUB-COMMITTEE

SUB-COMMITTEE ON SAFETY OF NAVIGATION (NAV)

		Target completion date/number of sessions needed for completion	Reference
1	**Routeing of ships, ship reporting and related matters**	Continuous	MSC 72/23, paragraphs 10.69 to 10.71; NAV 46/16, section 3
2	**ITU matters, including Radiocommunication ITU-R Study Group 8 matters**	Continuous	MSC 69/22, paragraphs 5.69 to 5.70; NAV 46/16, paragraphs 8.1 to 8.9
3	Casualty analysis (co-ordinated by FSI)	Continuous	MSC 70/23, paragraphs 9.17 and 20.4; NAV 46/16, paragraphs 15.24 to 15.28
~~H.1~~[*]	~~**Guidelines on ergonomic criteria for bridge equipment and layout**~~	~~2000~~	~~MSC 69/22, paragraphs 20.48, 21.32 and 21.39; NAV 46/16, paragraphs 6.1 to 6.8~~
~~H.2~~	~~**IMO Standard Marine Communication Phrases** (in co-operation with COMSAR and STW)~~	~~2000~~	~~MSC 68/23, paragraphs 2.3 to 2.5; MSC 71/23, paragraph 20.33; NAV 46/16, paragraphs 9.1 to 9.10~~
H.~~3~~ 1	**World-wide radio navigation system**	2001	MSC 69/22, paragraphs 5.65 and 20.43; NAV 46/16, paragraphs 7.1 to 7.10
[H.2	Revision of resolution A.815(19) on World-wide radionavigation system	2001	NAV 46/16, paragraph 7.11]

[*] Strikeout = proposed deletions
Grey = proposed additions/changes

SUB-COMMITTEE ON SAFETY OF NAVIGATION (NAV) (continued)

		Target completion date/number of sessions needed for completion	Reference
~~H.4~~	~~**Amendments to the COLREGs**~~	~~2000~~	~~MSC 69/22, paragraph 20.46; NAV 46/16, section 4~~
~~H.5~~	~~**Review of performance standards for shipborne satellite radionavigational receivers**~~	~~2000~~	~~NAV 46/16, paragraphs 7.15 to 7.20; MSC 70/23, paragraph 20.17.1~~
H.~~6~~ 3	**Performance standards for bridge watch alarms**	2001	MSC 71/23, paragraph 20.28; NAV 46/16, paragraphs 7.12 to 7.14
H.~~7~~ 4	**Guidelines for recording events related to navigation**	2001	MSC 72/23, paragraph 21.39.1; NAV 46/16, paragraphs 10.1 to 10.8
H.~~8~~ 5	**Guidelines on automatic identification system (AIS) operational matters**	2001	MSC 72/23, paragraphs 10.65 to 10.68; NAV 46/16, paragraphs 10.9 to 10.29
~~H.9~~	~~**Comprehensive review of chapter 13 of the HSC Code**~~	~~2000~~	~~MSC 70/23, paragraphs 20.17.4; NAV 46/16, paragraphs 11.12 to 11.13~~
[H.6	Guidelines on Voyage Data Recorders (VDR) ownership and recovery	2001	NAV 46/16, paragraph 15.38]
H.~~10~~7	Training and certification of maritime pilots and revision of resolution A.485(XII)	2001 ~~1 session~~	MSC 72/23, paragraph 21.39; NAV 46/16, paragraphs 15.9 to 15.19

SUB-COMMITTEE ON SAFETY OF NAVIGATION (NAV) (continued)

		Target completion date/number of sessions needed for completion	Reference
~~L.1~~	~~Performance standards for navigation systems and equipment~~		~~NAV 45/14, paragraphs 7.14 to 7.30~~
L.~~2~~ 1	**Development of guidelines for ships operating in ice-covered waters** (co-ordinated by DE)	~~2000~~ 2001	MSC 69/22, paragraph 20.51; MSC 71/23, paragraph 20.43; NAV 46/16, paragraphs 12.1 to 12.5
L.~~3~~ 2	**Integrated bridge systems (IBS) operational aspects**	2001	MSC 70/23, paragraph 20.17.2; NAV 46/16, section 5
~~L.4~~	~~**User requirements for heading systems**~~	~~2000~~	~~MSC 70/23, paragraph 20.17.3; NAV 46/16, paragraphs 7.21 to 7.25~~

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ANNEX 23

PROVISIONAL AGENDA FOR THE FORTY-SEVENTH SESSION*

SUB-COMMITTEE ON SAFETY OF NAVIGATION (NAV) – 47th session

Opening of the session

1 Adoption of the agenda

2 Decisions of other IMO bodies

3 Routeing of ships, ship reporting and related matters**

4 Integrated bridge systems (IBS) operational aspects

5 Guidelines relating to SOLAS chapter V on:

.1 recording events related to navigation

.2 Automatic Identification System (AIS) operational matters

[.3 Voyage Data Recorders (VDR) ownership and recovery]

6 Training and certification of maritime pilots and revision of resolution A.485(XII)

7 Navigational aids and related matters

.1 world-wide radio navigation system

[.2 revision of resolution A.815(19) on world-wide radionavigation system]

.3 performance standards for bridge watch alarms

8 ITU matters, including Radiocommunication ITU-R Study Group 8 matters**

9 Work programme and agenda for NAV 48

10 Election of Chairman and Vice-Chairman for 2002

11 Any other business

12 Report to the Maritime Safety Committee

***

* Agenda item numbers do not necessarily indicate priority.

** Items under continuous review.

ANNEX 24

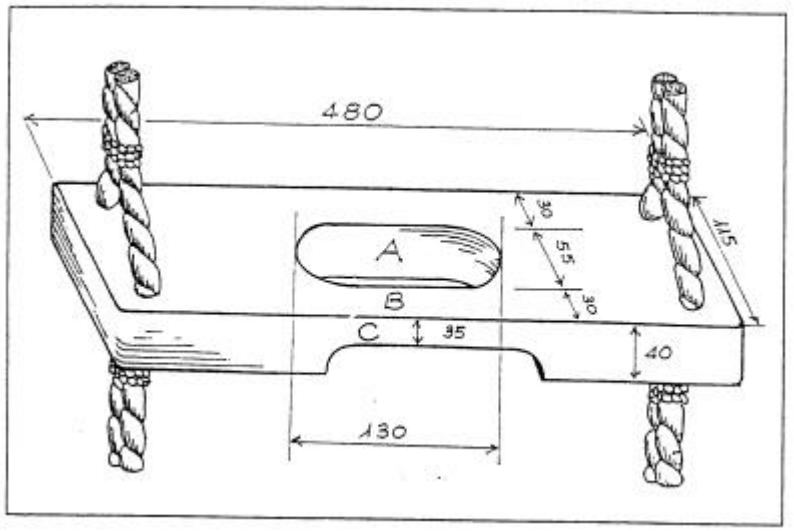
PROPOSED AMENDMENTS TO RESOLUTION A.889(21) – PILOT TRANSFER ARRANGEMENTS

Insert the following new sub-paragraph .8 in 2.1.1:

".8 in lieu of the requirements of 2.1.2.5, either all steps of the pilot ladder, or 4/5 of them after the first spreader step from bottom, should have a slot carved in their central part, in accordance with the specifications shown in the appendix."

APPENDIX

SPECIFICATIONS OF ALTERNATIVE STEPS OF THE PILOT LADDER



The step has a slot (A) carved in its central part which allows, by threading the fingers inside it, to firmly grasp the edge of the slot (B) in front of a person who uses the ladder.
The corners and edges of the slot should be adequately rounded.

The slot (A) should be symmetrically positioned in respect of the width of step.

DIMENSIONS OF STEPS

Length not less than 480 mm.
Width not less than 115 mm.
Thickness not less than 40 mm.

Length of the slot (A) not less than 130 mm.

Width of the slot (A) not less than 55 mm.

Thickness of the edge of the slot which is in front of the person who uses the ladder (C) } not less than 35 mm

Width of the edges of the slot (B) } not less than 30 mm each one

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ANNEX 25

PROPOSED DRAFT AMENDMENT TO THE INTERNATIONAL CODE OF SIGNALS

Amend chapter XII as follows:

Add a new signal.

SIGNAL	MEANING
Z-with one numeral	To call or address shore visual signal stations (Numeral to be approved by local port authority).

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ANNEX 26

AMENDED SECTION 2.4.6 ON NAVIGATION OF THE DRAFT GUIDELINES FOR THE DESIGN, CONSTRUCTION AND OPERATION OF PASSENGER SUBMERSIBLE CRAFT

"**2.4.6 Navigation**

2.4.6.1 Passenger submersible craft, when engaged in surface navigation, should be provided with means and/or procedures to enable the craft to be navigated safely. Autonomous craft should be provided with such visibility on the surface as will enable the craft to be navigated safely.

2.4.6.2 Provisions are to be made for the pilot to assess the situation in the area in which the craft is intended to surface.

2.4.6.3 Means are to be provided to render the passenger submersible craft, while on the surface, readily visible to other vessels.

2.4.6.4 Passenger submersible craft should be provided with navigational equipment to enable safe operations under all design conditions. Equipment may include, but not be limited to, directional indicator, depth indicator, depth sounder, clock, trim and heel indicator, underwater location device, speed and distance device, and Sonar. Navigational equipment should be located in the pilot's work area.

2.4.6.5 Submersible craft equipped with propulsion systems should be provided with adequate controls and indicators to enable safe operations under all design conditions.

2.4.6.6. Where a releasable location system is used the release arrangement may be manual or hand-hydraulic. It should not depend on electrical power for its operation and should be able to operate at all anticipated angles of heel and trim. The size of the float and length of line should be such that expected currents acting on the line do not prevent the float from coming to the surface.

2.4.6.7 Passenger submersible craft should have two independent instruments for registration of its depth. At least one of these instruments is to be a pressure gauge capable of functioning also in an emergency situation. If both are pressure gauges, they should not have common inlet. Passenger submersible craft operating in areas where the seabed depth is greater than the rated depth should have a depth alarm set at no greater than the rated depth of the craft."

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